Short communication

Dry and wet spells for agricultural planning in Udaipur region

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In Rajasthan, agriculture is dependent on rainfall and it's distribution. It is an established fact that the crop development will be affected if the dry spells coincides with the sensitive phenological stage of the crop. On the other hand, dry periods at ripening stage of the crop are often beneficial. Hence for the purpose of crop planning it is useful to know the dry and wet periods. Markov- chain probability model has been extensively used to determine the long term frequency behavior of dry and wet spells (Victor and Sastry, 1979) as well as for computation of probability of occurrence of daily precipitation (Stern, 1982). Pandarinath (1991) and Haripriya *et al.* (1996) used the Markov- Chain model to study the probability of weekly dry and wet spells.

The Udaipur district (24°35′ N and 73°42′ E) is situated in Rajasthan state with a total geographical area of 14,62,112 ha , out of which the cultivated area is about 3,60,250 ha . The average annual rainfall is 623.0 mm and its distribution is uneven and erratic. Daily rainfall data of 81 years (1921-2001) were collected from the College of Technology and Engineering, Udaipur, Maharana Pratap University of Agriculture & Technology , Udaipur. for analysis. Using weekly rainfall, the probability of occurrence of dry/wet weeks and consecutive dry weeks were computed by Markov- Chain process. Pandarinath (1991) considered less/more than 20 mm rainfall as dry/wet weeks respectively.

Using the above formula, probability of dry weeks preceded by dry weeks and wet weeks preceded by wet weeks and probability of consecutive 2 and 3 dry or wet weeks have been estimated.

Onset of the rainy season was computed from weekly rainfall data following Morris and Zandstra (1979). For forward accumulation, 22nd week has been considered as the starting period of monsoon rains. For the calculation of forward as well as backward

Table 1: Probability of dry and wet spells at Udaipur

Week No.	Probability of dry spells				Probability of wet spells			
	Pd	Pdd	D_2	D_3	Pw	Pww	W_2	W_3
22.	˙86	85	77	55	13	0	9	0
23.	81	89	59	45	18	66	0	0
24.	77	72	59	27	22	0	4	0
25.	77	76	36	21	22	20	4	3
26.	54	47	31	10	22	20	36	22
27.	40	58	13	8	41	80	36	23
28.	36	33	22	13	59	61	40	34
29.	45	62	27	20	59	64	45	29
30.	36	62	27	19	63	83	40	11
31.	50	60	36	23	54	64	22	14
32.	63	75	40	25	63	45	18	26
33.	59	72	36	25	54	50	31	13
34.	45	64	31	14	63	77	45	12
35.	40	61	18	15	50	83	18	13
36.	59	70	50	46	36	30	27	0
37.	63	44	59	47	40	66	18	0
38.	77	84	59	59	54	50	0	0
39.	81	92	88	78	59	0	0	0
40.	100	76	95	95	40	0	0	0
41.	95	100	95	18	36	0	0	0
42.	100	95	100	90	22	0	0	0
43.	100	100	90	90	18	0	0	0
44.	90	100	90	90	0	0	0	0

where Pd, Pdd, D_2 and D_3 are probability of week being dry, dry followed by dry week, two weeks dry and three weeks dry respectively and Pw, Pww, W_2 and W_3 are probability of week being wet, wet followed by dry week, two weeks wet and three weeks wet respectively

accumulation, the weekly rainfalls are arranged in columns and the years are arranged in rows. Weekly rainfall was summed by forward accumulation until 75 mm of rainfall is accumulated.

Backward accumulation of rainfall was used for termination or withdrawal of rainy season. Accumulation of 10 mm

Table 2: Onset and withdrawal of south-west monsoon

Parameter	Onset	Withdrawal	Duration
Mean week	27	41	14 (98 days)
Earliest week	23	33	3*
Latest week	36	52@	28**
C. V. (%)	8	10	31.76

* Minimum   **Maximum   @ winterains received upto 52nd week

rainfall was chosen for the termination of rainy season.

It is evedence from Table 1 that the probability of occurrence of a dry week is high (77 to 100 per cent) in the first 25th week of the year and then falls subsequenty. The probability of occurrence of dry week again increases from 36th to 52 nd week of the year . The conditional probability of dry week preceded by a dry week is also high (76 to 100 per cent) up to 25th week and then falls in the subsequent weeks . The probability of occurrence of dry week preceded by dry week again increases from 37th week . But the probability of occurrence of two consecutive dry weeks is high (59 to 100 per cent) up to 24th week and then falls in subsequent weeks

Similarly the probability of occurrence of wet week is very low (0 to 27 per cent) up to 26th week and thus starts increasing up to 34th week (Table 1). Thus, till 44th week except 51st

week after which it reduces even to the level to zero percent. The conditional probability of wet week preceded by a wet week is low up to 26th week and then it increases up to 38th week except 36th week.

The probability of occurrence of two consecutive wet week is low up to 24th week and then it increases up to 36th week, but suddenly decreasing from 38th week. The probability of the three consecutive wet week very poor till 25th week and maximum probability occurred in 28th week (34 percent). Then it reduces to zero percent by 36th week.

The results of the forward and backward accumulation of rainfall that the mean week of onset was observed as 27th week with a coefficient of variation 8 percent and mean withdrawal was observed in 41st week with a coefficient of variation of 10 percent (Table 2).

Critical analyses of the above results indicate that sowing of crops may

be started in 27th week (2nd to 8th July) in Udaipur region. The mean duration of rainy season was observed as 14 weeks (98 days) with a coefficient of variation of 31.7 percent. Hence the farmers of Udaipur region can take short duration crops of maize, sorghum, oilseed and pulses of 80-90 days duration. Second crops like mustard, Taramira and grams can be taken up during 40th to 42nd week. It can be concluded that the safe sowing period during *kharif* season is from 27th (2nd to 8 thJuly) to 29th week (16 st to 22 July).

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