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RAINFALL CHARACTERISTICS ANALYSIS OF MAIN RESEARCH STATION, HEBBAL (BANGALORE)

1. Main research station belonging to the University of Agricultural Sciences, Bangalore is located at latitude 12° 58′ N, longitude 77° 37′ E and has altitude 899 m amsl. It is located 10 km north to Bangalore city. It belongs to the semi-arid region. 40 years daily rainfall data of this station has been considered in this analysis. The annual normal rainfall of this station (1951-1990) is 810.7 mm. From the daily rainfall data weekly rainfall values have been generated. During crop growth period the amount of rainfall in any Meteorological Week (MW), to meet the atmospheric demand so that crops do not suffer with moisture deficiency, is considered as the minimum amount of rainfall to be called as wet week.Since this comes under semi-arid region a minimum of 10 mm weekly rainfall (1/3 PET value, as weekly PET = 30 mm) (Virmani 1975) would be enough to meet the water demand by the crops during cropping season. Hence, rainfall of 10 mm or more per week is considered as wet week (*W*) and if the rainfall is less than 10 mm, then the week is said to be dry week (*D*). The initial probabilities of wet week *P*(*W*), dry week *P*(*D*), and conditional probabilities of wet week followed by wet week *P*(*W/W*), wet week followed by dry week *P*(*W/D*), dry week followed by wet week *P*(*D/W*) and dry week followed by dry week *P*(*D/D*) have been worked out following the Markov chain procedure described by Robertson (1976).

2. *Results and discussion* — In Table 1 probability levels and expected rainfall at different probability levels are given for selected weeks. *P*(*W*) is maximum (80%) in 38 MW. *P*(*W*) is above 50% between 20 and 22 MW (17-31 May) and 28 and 43 MW (12 July to 25

TABLE 1

Initial and conditional probabilities (%) and expected rainfall (mm) at different probability levels

Met. week	*P*(*W*)	*P*(*D*)	*P*(*W/W*)	*P*(*W/D*)	*P*(*D/W*)	*P*(*D/D*)	50%	60%	70%	80%	90%
20	69.23	30.77	71.43	68.00	28.57	32.00	17.7	14.0	8.2	1.8	0.0
21	61.54	38.46	55.56	75.00	44.44	25.00	17.7	9.5	5.8	2.0	0.0
22	58.97	41.03	54.17	60.00	41.67	40.00	16.2	6.9	3.8	2.0	0.0
23	48.72	51.28	43.48	56.25	56.52	43.75	8.5	4.8	2.3	1.2	1.0
24	43.59	56.41	52.63	35.00	47.37	65.00	9.0	4.4	2.8	0.0	0.0
25	43.59	56.41	41.18	45.45	58.82	54.55	7.6	3.8	2.2	1.4	0.2
26	38.46	61.54	35.29	40.91	64.71	59.09	7.5	4.1	3.0	1.9	0.7
27	42.11	60.53	40.00	41.67	60.00	58.33	8.3	6.1	4.3	1.0	0.0
28	47.37	55.26	43.75	47.83	56.25	52.17	9.8	7.8	4.8	2.8	2.3
29	71.05	31.58	66.67	71.43	33.33	28.57	15.7	12.7	10.5	4.8	1.5
30	63.16	39.47	59.26	66.67	40.74	33.33	17.7	13.5	6.6	3.2	0.8
31	60.53	42.11	62.50	53.33	37.50	46.67	16.5	10.3	7.5	4.5	0.0
32	62.50	37.50	65.22	62.50	34.78	37.50	15.4	12.2	7.7	6.8	3.3
33	62.50	37.50	64.00	60.00	36.00	40.00	19.0	16.4	7.1	3.9	0.8
34	62.50	37.50	76.00	40.00	24.00	60.00	17.8	12.6	6.7	2.7	1.3
35	62.50	37.50	56.00	73.33	44.00	26.67	17.7	14.4	7.0	3.8	1.0
36	42.50	57.50	52.00	26.67	48.00	73.33	7.1	3.7	1.9	1.0	0.2
37	65.00	35.00	70.59	60.87	29.41	39.13	20.1	14.0	6.1	1.1	0.0
38	80.00	20.00	88.46	64.29	11.54	35.71	48.0	36.0	20.7	11.3	4.6
39	67.50	32.50	71.88	50.00	28.13	50.00	32.9	20.5	7.4	2.2	0.6
40	62.50	37.50	59.26	69.23	37.04	30.77	32.9	13.2	6.0	0.8	0.0
41	60.00	40.00	72.00	40.00	28.00	60.00	22.0	9.5	6.4	1.2	0.0
42	55.00	45.00	54.17	56.25	45.83	43.75	12.4	7.6	1.8	0.0	0.0
43	52.50	47.50	50.00	55.56	50.00	44.44	11.5	6.7	1.9	0.0	0.0

October). *P(W/W)* is more than 50% during 20 and 22 MW and, 29 and 43 MW. Therefore, if the crops are sown around 22 or 23 MW they are likely to be caught in dry spell during 23 and 28 MW. If sowing is done around 28 or 29 MW, probability indicates success of the crop at least 50% of the years. Variety of the crops selected should be such that the maximum water requirement stage of the crop coincides with 37 to 39 MW (13-28 September) so that crop would get sufficient moisture.

Following the method of Doorenbos and Pruitt (1977) the amount of rainfall expected at 50%, 60%, 70%, 80% and 90% probability levels have been worked out for 40 years and presented in Table 1. The highest amounts of rain which could be expected are 48.0 mm at 50%, 36 mm at 60%, 20.7 mm at 70%, 11.3 mm at 80% and 4.6 mm at 90% probability levels during 38 MW.

3. *Conclusion* — The CV of annual rainfall is (27.7%) and rainy days is (24.6%). In 52 meteorological weeks, 38 MW receives highest rainfall 57.1 mm. Since more than 50% probability of getting wet week is found between 29 and 43 MW one can take up the sowing after 29 MW, so that the moisture deficiency between 23 and 28 MW could be avoided. The sowing of any crop should be such that the maximum consumption of water by the crop should coincide with 37 to 39 MW, so that crops do not suffer with inadequate moisture and give good yield.

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