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RESEARCH PAPER

Rainfall distribution pattern in Kolasib district of Mizoram

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Abstract : Twenty five years (1980- 2004) monthly rainfall data collected at ICAR RESEARCH COMPLEX FOR NEH Region, Mizoram centre, were analysed for the probabilwastic distributuion of rainfall. The data recorded at the centre, were arranged in descending order to find out the rank order number in Doorenboss and Pruitt formula. The data analysed revealed a large variation in monthly rainfall distributuion pattern of Kolasib district. At any probability level, the minimum assured monthly rainfall pattern varied widely.

Key Words : Rainfall, Probability, Distributuion

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INTRODUCTION

The success or failure of farming in this area was intimately related to the prevailing weather conditions. Rainfall is one of the most important factor influencing the crop growth. Rainfall influences many farming operations such as the preparation of land, sowing, harvesting and threshing. Several weather components affect the crop growth hence crop weather relationships is of immense practical value. Selection of crops and cropping patterns are based on the water availability, and on the number of wet months *i.e.*, those in which rainfall exceeds evapotranspiration etc. Without proper information about climatic factors *viz.*, rainfall, temperature, humidity, crops introduction and upbringing may not give the desired production. It is an established fact that water requirement of the crops can be fully or partly met by rainfall. In a state like Mizoram management of available water is of paramount importance. The state is mostly dependent on rain water resources for its agricultural operations.

Kolasib district is one of the five agricultural important districts of Mizoram. All the major farming operations are mostly rain dependent. Proper knowledge about rainfall distributuion pattern can be very useful for planning various agronomic operations like preparation of land, manuring, sowing, weeding, transplanting, harvesting threshing, drying etc. An important aspect of decision making process was dependent on distributuion of rainfall. It is very pertinent for a farmer to know how much rainfall can be expected atleast in a time interval. In the light of these facts, the present paper determines amount of rainfall which can be predicted at any level of probability for Kolasib district.

MATERIALS AND METHODS

Twenty five years (1980- 2004) monthly rainfall data collected at the centre were used to determine the

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probabilwastic distributuion of rainfall. The data were arranged in descending magnitude and each record was assigned a number called Rank Number (m). Ranking order method of Doorenboss and Pruit (1975) was then used to make rain plotting position. For highest value of rainfall data it was given rank number 1 and the last rank number for the lowest rainfall data. Probability numbers F a (m) in per cent was calculated for these rank numbers by Doorenboss and Pruitt (1975) formula :

F a (m) = 100 m / n+1

where n = number of records (in present case 25)

m= rank number

RESULTS AND DISCUSSION

The rainfall received and recorded for twenty five years period (1980-2004) for Kolasib is given in Table 1. A perusal of data presented in Table 1 indicated that the mean monthly rainfall varied widely. During lean periods *i.e.* from November to February mean rainfall received for twenty five years varied from 18.7, 32.4, 9 and 35.7 mm, respectively. However, the eight months received heavy downpour, where mean monthly rainfall varied from 116.9mm in the month of March to 450.8mm in the month of August. For the months of April, May, June, July, September and October mean monthly variations were for 218.2mm, 355.8mm, 388.9mm, 448.1mm, 323.2mm, and 164.7mm, respectively. The perusal of data also indicated that rainfall was not evenly distributed and the intensity during the months from May to October was very high. This was the period when the district experiences major landslides and landslips.

A perusal of Fig. 1 indicated that rainfall in Kolasib was mainly concentrated during monsoon months *viz.*, June, July, August and September. In these four months of monsoonal period, the district received average of 64 per cent of the total annual rainfall. However, one unique thing about the district was, it received average 27 per cent of its total annual rainfall in the pre-monsoonal months of March, April and May. In the

Table 1 : Rainfall data for twenty five years(1980-2004) recorded at ICAR Mizoram Centre,Kolasib

Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1980	3.4	33.2	156.5	344.3	464.4	590.5	1020.9	314	383.4	162.8	0	0
1981	44.8	45.8	121.9	302.4	425.2	347.8	415.9	381.8	241	57.7	59.1	0
1982	0	105.9	84.95	426.3	250.8	441.4	443.8	453.92	175.63	139.68	24.29	0
1983	49.63	40.12	348.39	356.63	406.11	347.3	424.17	680.79	386.16	177.91	11.18	47.5
1984	4.47	0	6.15	98.96	711.1	248.38	277.48	203.4	224.35	271.86	0	6.15
1985	5.03	40.03	58.42	128.5	287.32	614.37	292.86	328.85	307.99	68.5	0	0
1986	7.5	15	11	327	120	297	522.5	442	297	301	68	0
1987	7.2	0	131	386	104	385	390	476	430	99	136	6
1988	0	35	140	120.2	374.5	251.1	358.6	236.8	433.4	219.2	85.8	49.8
1989	0	25	0	154.4	203.2	151.8	446	459	296	193.8	2.6	0
1990	0	34.6	173.2	338.6	204.6	294	306.8	471	224	218.4	57.5	16
1991	26	70	128.6	318.45	886	438.25	138.45	453.49	298.75	195.7	70	86.5
1992	0	44.25	55	151	360	238.75	463.53	554.8	386.74	51.25	0.5	19.9
1993	4.5	101.25	110.5	167.25	526.4	510.7	680.5	524.85	340.5	115.6	12	0
1994	7.5	18.5	65.5	84	88.3	464	441	380.5	157	55	1	0
1995	1.5	23	113.8	152.5	301.5	214.5	207	376	349	154	128.5	0
1996	0	18.5	229.25	338	430	304	217.5	161.5	179.25	98.25	28	1.5
1997	4	22.5	124.25	106.5	256.25	213.5	637.75	334	529.5	60.5	0.75	88.5
1998	35	25.5	210.1	141.5	262.5	387	348.6	401.7	102.3	88	35	0
1999	0	0	64	23.6	434.5	278.25	439.5	461	328.25	264.25	9	1.5
2000	16.75	37.25	219.25	435.2	455.9	315.2	307.3	736.8	346.6	218	0	0
2001	0	139.5	114	163.2	358.8	844.9	594.4	382.2	447.5	286.5	71.5	67.03
2002	0	0	91	212.4	544.5	335	347.7	547.6	114	205.2	8.24	4.2
2003	6.5	18.2	165	79.4	96.7	468.5	627.5	667.5	587.6	219.8	0	74
2004	0	0	0	98	342	741.5	852	840	514	195	0.5	0
Mean	9.0	35.7	116.9	218.2	355.8	388.9	448.1	450.8	323.2	164.7	32.4	18.7
Stand. Dev.	14.1	34.4	79.7	121.6	184.9	165.3	197.4	157.5	125.3	76.2	40.3	29.7
C V (%)	157.2	96.4	68.2	55.7	52.0	42.5	44.0	34.9	38.8	46.3	124.5	158.2

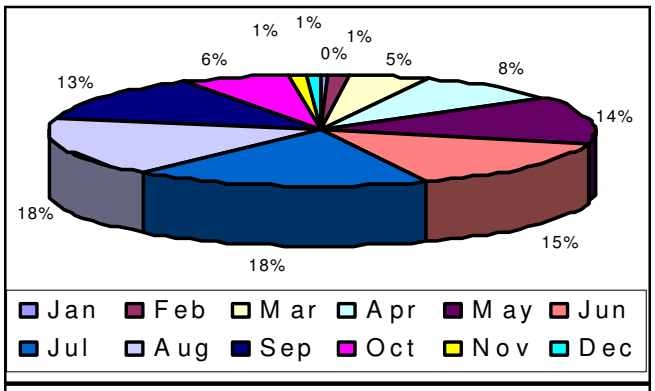

Fig. 1 : Mean monthly rainfall distributuion pattern based on 25 years data

post monsoonal period ie from October to February the district received 9 per cent of the total annual rainfall. At both pre and post monsoon period there was high variability in the rainfall received. Mostly eighty to ninety per cent of the total rainfall in the country occurs during the south-west monsoon season and the success of agriculture in India, depends primarily on the timely onset, the proper amount and the distribution of rains. The dates of the onset of the S-W monsoon, its intensity in different parts of the country and the the distribution of rain display large variations in time and space. The S-W monsoon normally breaks in the district in the first week of June (Ramdas,1966). Apart from S-W monsoon the region also receives rains from N-E monsoon during February –March and May months. But all the major agricultural operations start in second fortnight of March itself, after burning of Jhums. Sometimes, sowing of crops in Jhums earlier than March was also observed in Kolasib. In the context of jhum land there was no definite delineation of the slope etc. As per the convenience of the farmers, sowing was carried out. However, the workload was less in the months of October to January (Fig. 2) which also coincides with the lean period. Again from the months of January onwards, the arduous task of slashing the jungle begins. Actual farming operations starts after the completion of burning and cleaning in the burnt jhums *i.e.* from 15th of March. This is the period when the state experiences heavy hailstorms and showers.

Distributuion of monthly rainfall in Kolasib district can be classified as:

– Pre- monsoonal months (March, April and May) -

Table 2 : Estimation of minimum assured rainfall at a particular probability level

Probability %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.85	49	139	348	435.2	886	844	102	840	587	301	136	88.5
7.69	44.8	105	229	426.3	711.1	741	852	736	529	286	128	86.5
11.54	35	101	219	386	544.5	614	680	680	514	271	85.8	74
15.3	26	70	210	356.6	526.4	590	637	667	447	264	71.5	67.0
19.23	16.75	45.8	173	344.3	464.4	510.7	627.5	554.8	433	219	70	49.8
23.08	7.5	44.25	165	338.6	455.9	468.5	594.4	547.6	430	219	68	47.5
26.92	7.5	40.1	156	338	434.5	464	522	524.8	386	218	59.1	19.9
30.77	7.2	40	140	327	430	441	463.5	476	386	218	57.5	16
34.62	6.5	37.25	131	318.45	425.2	438.2	446	471	383	205	35	6.15
38.46	5.03	35	128.6	302.4	406.11	387	443	461	349	195	28	6
42.31	4.5	34.6	124.2	212.4	374.5	385	441	459	346	195	24.2	4.2
46.15	4.47	33.2	121	167.25	360	347	439.5	453	340	193	12	1.5
50	4	25.5	114	163.2	358.8	347	424	453.4	328	177	11.1	1.5
53.85	3.4	25	113.8	154.4	342	335	415	442	307	162	9	0
57.69	1.5	23	110.5	152.5	301.5	315.2	390	401.7	298	154	8.24	0
61.54	0	22.5	91	151	287.32	304	358	382.2	297	139	2.6	0
65.38	0	18.5	84.9	141.5	262.5	297	348.6	381	296	115	1	0
69.23	0	18.5	65.5	128.5	256.25	294	347.7	380.5	241	99	0.75	0
73.08	0	18.2	64	120.2	250.8	278.2	307.3	376	224	98.2	0.5	0
76.92	0	15	58.4	106.5	204.6	251	306	334	224	88	0.5	0
80.77	0	0	55	98.96	203.2	248	292	328	179	68	0	0
84.62	0	0	11	98	120	238	277	314	175	60.5	0	0
88.46	0	0	6.15	84	104	214.5	217.5	236	157	57	0	0
92.31	0	0	0	79.4	96.7	213.5	207	203	114	55	0	0
96.15	0	0	0	23.6	88.3	151.	138.4	161.5	102.	51.2	0	0

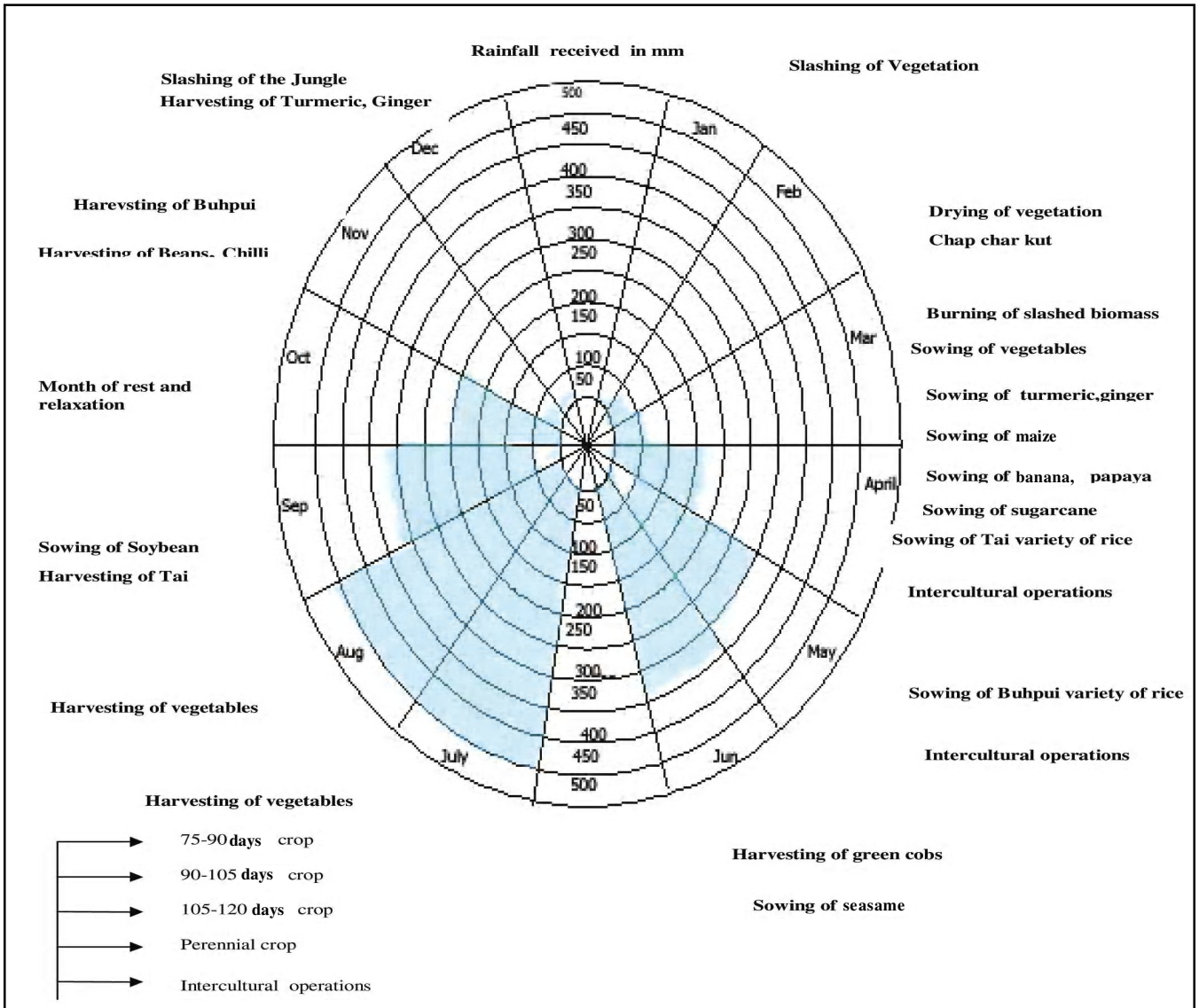

Fig. 2 : Jhum calendar showing major operations carried out in Jhum based on rainfall received

Twenty seven per cent of the total rainfall.

– Monsoonal months (June, July, August and September) - Sixty four per cent of the total rainfall.

Post- monsoonal months (October, November, December, January and February)- Nine per cent of the total rainfall

Prediction of rainfall at different probability level:

A perusal of data presented in Table 2 indicated that at a particular level of probability rainfall predicted varied month wise. Higher percentage of rainfall can be expected at lower level of probability. Lesser assured rainfall can be expected at higher level of probability level. A perusal of data presented in Table 3 indicated that at 25 per cent, 50 per cent, 75 per cent, 96 per cent of probability level, minimum assured rainfall predicted for the month are 7.5mm, 4 mm, 0mm and 0 mm. Similarly, at 25 per cent, 50 per cent, 75 per cent, 96 per cent of probability level for the month of May, minimum assured rainfall can be predicted as 434.5mm, 358.8mm, 204.6mm and 88.3mm, respectively. Similarly in the monsoonal months of June, July August and September, at 50 per cent,at 75 per cent,at 96 per cent of probability level, minimum assured rainfall which can be predicted are 464mm at 25 per cent of probability level, 347.3mm at 50 per cent of probability level, 51.1mm at 75 per cent of probability level, 151.8mm at 96 per cent of probability level for the month of June. For the month of July minimum assured rainfall can be predicted as 522.5mm at 25 per cent of probability level, 424.17mm at 50 per cent of probability level, 306.8mm at 75 per cent of probability level, 138.45mm at 96 per cent of probability level. Similarly for the month of August, minimum assured rainfall which can be predicted as 524.85mm

Table 3 : Minimum assured rainfall predicted at 25, 50, 75 and 96 per cent of probability level

Sr. No.	Months	Minimum assured rainfall at probability level			
		25 (%)	50(%)	75(%)	96(%)
1.	January	7.5	4	0	0
2.	February	40.12	25.5	15	0
3.	March	156.5	114	58.42	0
4.	April	338	163.2	106.5	23.6
5.	May	434.5	358.8	204.6	88.3
6.	June	464	347.3	251.1	151.8
7.	July	522.5	424.17	306.8	138.45
8.	August	524.85	453.49	334	161.5
9.	September	386.74	328.25	224	102.3
10.	October	218.4	177.91	88	51.25
11.	November	59.1	11.18	0.05	0
12.	December	19.9	1.5	0	

at 25 per cent of probability level,453.49mm at 50 per cent of probability level,334mm at 75 per cent of probability level,161.5mm at 96 per cent of probability level. Similarly for the month of September minimum assured rainfall which can be predicted as, 386.74mm at 25 per cent of probability level, 328.25mm at 50 per cent of probability level,224mm at 75 per cent of probability level and 102.3mm at 96 per cent of probability level.

Conclusion:

Several crops are grown in areas without consideration of the climate much of production potential of the vast resources can be utilized by knowing the weather parameters. One very important environmental risk in a state like Mizoram which was having tropical to subtropical to sub humid climate was of rainfall. The state is completely dependent on rain water resources received. And for management of the already depleted perched water resources for crop production was a big challenge for one and all.

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