

Research Note

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ANALYSIS OF RAINFALL DATA AT AMF UNIT - LAM, GUNTUR DISTRICT OF ANDHRA PRADESH

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Rainfall is the important and unique hydrological phenomenon with temporal and spatial variations and an important factor in deciding agricultural crops cultivation and strategic planning of crops for an area. Fluctuations in the quantity of rainfall and its distribution is a varying phenomenon, such comprehensive knowledge about the total rainfall and its distribution pattern round the year of a area is very important for better crop planning, determining irrigation scheduling and drainage requirement of crops, design and construction of soil and water conservation structures, etc. In rainfed agriculture, the total amount of rainfall and its distribution in a particular area affects the plant growth and its yield and yield parameters, respectively.

Drought is a normal recurring climatic phenomenon that varies in space, time, and intensity. Drought is one of the most serious problems for human societies and ecosystems. It gradually establishes with the negative anomaly of rainfall for a required period and it is one of the most damaging types of natural disasters over long periods. It is necessary to know about the time, locations, severity, and pattern of droughts for effective planning and decision making.

Information about drought occurrence helps officials and farmers to be more proactive in managing drought risks. Impacts of drought can be reduced through better understanding and identifying the appropriate drought indicators for an early warning system. It is being monitored by computing indices based on rainfall and many other parameters. In the last few decades, several drought indices have been developed based on several parameters, the details of which can be found in Venkatesh *et al.* (2016), Mishra and Singh (2010), Dai (2011) and Pandey *et al.* (2014). Keeping this in view, an attempt was made to evaluate drought occurrence patterns of weekly, seasonal, monthly, and annual rainfall according to the severity, based on 45 years (1975-2018) data recorded at Regional Agricultural Research Station, Lam, Guntur district of Andhra Pradesh.

Daily rainfall data recorded at RARS, Lam Guntur was used for this study. Rainfall data from 1975 to 2018 was analysed on a yearly and monthly basis for 45 years. This analysis was carried out during March-June, 2019, and results were classified as a drought, normal and wet events depending upon the following criteria (Sharma *et al.*, 1979).

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Table1. Annual rainfall analysis to access the deviations in rainfall distribution pattern of AMFU, RARS, Lam

S.No.	Year	Rainfall received (mm)	Deviation from long period average Rainfall (%)	Class	Time interval between the years	Chances for occurrence the events (%)
1	1979	471.0	-47.0	Moderate Drought	--	11.1
2	1984	612.9	-31.5		4	
3	1992	671.5	-25.1		8	
4	2002	618.8	-30.9		10	
5	2009	650.8	-27.3		7	
6	1991	695.9	-22.3	Deficit Rainfall	---	6.6
7	2017	678.8	-24.2		26	
8	2018	694.6	-22.4		0	
9	1998	1220.8	+36.3	Excess Rainfall	--	13.3
10	2000	1116.3	+24.6		1	
11	2003	1174.8	+31.1		2	
12	2010	1515.9	+69.2		7	
13	2012	1194.3	+33.3		2	
14	2013	1210.3	+35.1		0	

Table 2. Seasonal rainfall data analysis for Wet, Normal and Dry Seasons

Month	Mean (N)	N/2	2N	WS	PWS	NS	PNS	DS	PDS
Monsoon	591.0	295.5	1182.0	0.0	0.0	44.0	97.8	1.0	2.2
Post-Monsoon	200.0	100.0	400.0	6.0	13.3	29.0	64.4	10.0	22.2
Winter	29.8	14.9	60	9.0	20.0	7.0	15.6	29.0	64.4
Summer	72.8	36.4	146	6.0	13.3	29.0	64.4	10.0	22.2

*WS –Wet Season, NS- Normal Season, DS- Dry Season, PWS- Probability of Wet Season, PNS- Probability of Normal Season, PDS- Probability of Dry Season

Yearly Drought Analysis

Meteorological Drought is defined usually based on the degree of the dryness. According to IMD, meteorological drought is defined as occurring when the seasonal rainfall received over an area is less than 75% of a Long Period average value. It is further classified as a moderate drought, if the rainfall deficit is within a range of 25% to 50%, severe drought if departure exceeds 50% (Pandey *et al.*, 2014).

Percentage Occurrence of Drought

It is defined as the number of drought events occurred divided with the total number of record and multiplied with a hundred.

Seasonal/ Monthly/ Weekly Drought Analysis

N is the Normal Seasonal/ Monthly/ Weekly Rainfall, a Season / Month / Week receiving rainfall less than half N is termed as Drought Season / Month / Week and on another hand, a Season / Month / Week that receive rainfall more

Table 3. Seasonal rainfall data analysis for wet, normal and dry seasons

Month	Mean (N)	N/2	2N	WM	PWM	NM	PNM	DM	PDM
January	5.9	2.9	11.8	6.0	13.3	2.0	4.4	37.0	82.2
February	10.3	5.1	20.6	6.0	13.3	4.0	8.9	35.0	77.8
March	8.1	4.0	16.1	7.0	15.6	5.0	11.1	33.0	73.3
April	13.3	6.7	26.6	9.0	20.0	11.0	24.4	25.0	55.6
May	51.5	25.7	102.9	3.0	6.7	26.0	57.8	16.0	35.6
June	103.8	51.9	207.6	2.0	4.4	33.0	73.3	10.0	22.2
July	169.0	84.5	338.0	1.0	2.2	39.0	86.7	5.0	11.1
August	176.2	88.1	352.4	1.0	2.2	33.0	73.3	11.0	24.4
September	142.5	71.2	284.9	2.0	4.4	30.0	66.7	13.0	28.9
October	144.8	72.4	289.6	3.0	6.7	30.0	66.7	12.0	26.7
November	55.2	27.6	110.4	6.0	13.3	19.0	42.2	20.0	44.4
December	15.2	7.6	30.5	7.0	15.6	6.0	13.3	32.0	71.1

*WM –Wet Month, NM- Normal Month, DM- Dry Month, PWM- Probability of Wet Month, PNM- Probability of Normal Month, PDM- Probability of Dry Month

than double the normal(N) is termed as wet Season / Month / Week.

Forty-five years rainfall was analysed to find out the drought years, deficit rainfall years and excess rainfall years (Table1). Among the years of study *i.e.* 1975 to 2018 the annual rainfall of five years was moderately drought, and 11.1% occurrence of moderate drought condition was noticed. Besides, analysis for deficit rainfall was carried out and the results indicated that 1991, 2017, 2018 were showing deficit rainfall status with percent deviation of rainfall from long-period average rainfall of -22.3, -24.2 and -22.4 (Table1).

Year-wise rainfall investigation for the past 45 years (1975-2018) was carried out to record the years with above-normal and excess rainfall. Among the period under study, six years (13.3%) noticed excess rainfall among the six

years 2010 with highest rainfall 1515.9 mm with +69.2 % deviation from the long period average rainfall (Table 1).

Agricultural season-wise rainfall analysis was carried out to find out the probability of dry normal and wet seasons. The results denoted that monsoon season being normal is indicated with 97.8% probability. Out of 45 years under the study, 44 monsoon seasons received normal rainfall and only one season received below the normal rainfall. Post-monsoon season probability being normal is 64.4%. Winter season probability being normal is less probable than probability of dry season and wet season. Summer season probability being normal season is 64.4% (Table 2).

The results of the month-wise rainfall indicated that out of 12 months, the probability of being wet month ranges from 2.2%-20%.

Probability of months being normal is low from January to April. Probability of being normal is high from May to November months and the probability of dry months is higher from January to April and December (Table 3).

Overall, it is indicated that pre-monsoon and post-monsoon months are most probably normal and in case of annual rainfall analysis none of the years experienced severe drought for the last 45 years and there was only 11% probability for experiencing moderate drought.

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