

Rainfall variability and its impact on agriculture in north Telangana regions of Andhra Pradesh

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ABSTRACT

To study the rainfall characteristics of North Telangana region of Andhra Pradesh, monthly rainfall data forty years (1963-2002) have been analysed. Results indicated that, the rainfall decreased in recent 20 years in all the districts compared to previous 20 years. The dependable rainfall decreased in the month of September compared to previous 20 years. However, there was an increase in dependable rainfall in October in all the districts which enables timely sowing of *rabi* crops in black cotton soils of the region.

Key words : Rainfall variability, dependable rainfall, Telangana

Study of rainfall over a long period reveals general pattern of rainfall of a particular place and helps in understanding the amount, intensity, distribution and other rainfall characteristics. Efficient cropping systems can be evolved by understanding the rainfall pattern besides taking decision on time of sowing, scheduling of irrigation, time of harvesting etc. Rainfall analysis is necessary for designing farm ponds, tanks or irrigation projects also.

An overview of impact of climate variability on agriculture was given by Sikka and Pant (1990). Borgoankar and Pant (2001) have reported the Indian monsoon rainfall trendless nature since 17th century based on proxy data with large inter – annual fluctuations.

The climate of Andhra Pradesh is arid to semi-arid, except for the coastal belt which has humid to sub-humid climate. Andhra Pradesh receives rainfall both by South-West and North-East monsoons. The annual average rainfall of Andhra Pradesh is 941 mm of which 68 per cent is received during South-West monsoon season (Reddy *et al.*, 2004).

The North Telangana zone of Andhra Pradesh consists of 6 districts viz. Adilabad, Nizamabad, Medak, Karimnagar, Warangal and Khammam districts. The annual average rainfall of the region is 1043 mm, of which 84 per cent is received during South-West monsoon season from June-September. The predominant crops of the region are rice, maize, cotton, jowar, pulses, sugarcane and turmeric etc. Rice is grown

under irrigated conditions (wells and canals) whereas maize, jowar, cotton and pulses are being grown under rainfed conditions. Any shift or deviation in the amount of rainfall during South-West monsoon season in these districts may have adverse impact on crop growth and yield. In recent years, there is a feeling amongst the policy makers regarding increased variability in the rainfall. By keeping above facts in view, a detailed analysis of rainfall has been carried out to understand the monthly dependable and dependability of rainfall in the different districts of the zone.

MATERIALS AND METHODS

District-wise monthly rainfall data of 40 years (1963-2002) have been collected from the Bureau of Economics and Statistics, Govt. of Andhra Pradesh to study the rainfall characteristics. Nine year moving averages and dependable rainfall, were worked out. Nine year moving averages were computed to know the trends in rainfall pattern in different districts of North Telangana zone of Andhra Pradesh and dependable rainfall was worked out for each month for each district to know the minimum possible or assured rainfall.

Mean monthly rainfall of recent decade (1993- 02) was compared with previous three decades (1963-1992), while coefficient of variation and dependable rainfall of recent 20 years (1983-2002) over previous 20 years (1963-1982) was compared to know the rainfall variability in different months.

RESULTS AND DISCUSSION

Analysis of rainfall by employing nine years moving average technique revealed that in all the districts of North Telangana the rainfall was on decreasing trend in recent years (Fig.1). The decrease in rainfall was much higher in the districts of Karimnagar, Nizamabad and Medak compared to the Adilabad, Khammam and Warangal. The rainfall trend in latter three districts in recent years indicated that, the rainfall trend following the more or less normal rainfall of the district while in Karimnagar, Nizamabad and Medak it was much below the normal rainfall of the respective districts. Moreover decreasing trend in rainfall started from 1987 onwards in Karimnagar, Nizamabad and Medak whereas in Adilabad, Khammam and Warangal it started from 1992-93 onwards.

In all the districts of North Telangana zone mean monthly rainfall decreased in recent decade (1993-2002) compared to mean monthly rainfall of early thirty years (1963-92) in the months of June (except Adilabad), July and September months (Table 1). However, in the month of August, the mean monthly rainfall increased in recent (1993-02) decade over mean of early thirty years (1963-92) in Khammam and Warangal districts, whereas it was decreased in other districts of the zone. It is interesting to note that the mean monthly total rainfall was increased in the month of October in all the districts of the zone. There was considerable decrease in mean monthly rainfall (36.8 mm) in Medak district and was

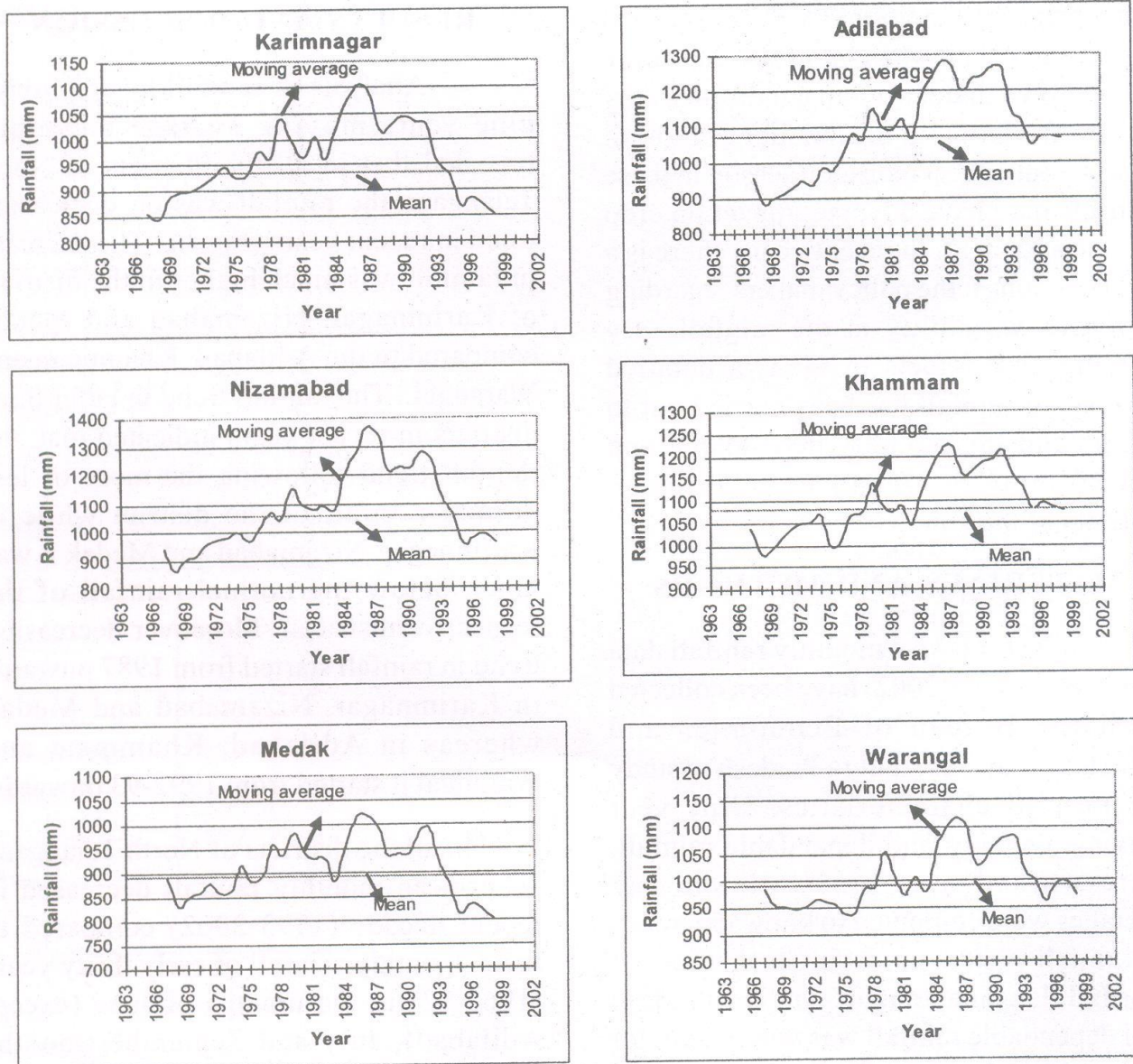


Fig.1 : Inter - annual variability of rainfall (mm) in North Telangana districts of Andhra Pradesh (9 years moving average)

minimum (11.9 mm) in Khammam in the month of June. In July, there was maximum decrease in mean monthly rainfall in Nizamabad (76.5 mm) followed by Medak (70.0 mm). Similarly, in the month of September the decrease in mean monthly rainfall was highest in Nizamabad followed by Medak and it was lowest in Adilabad

district. In the month of October, the highest increase in mean monthly rainfall was observed in Nizamabad followed by Medak district and it was minimum increase in Khammam district. The rainfall in the months of June, July and September are crucial in agricultural point of view as the June rainfall considerably influence the

Table 1: Mean monthly rainfall (mm) in different districts of North Telangana Zone of Andhra Pradesh

District	June		July		August		September		October	
	1963-92	1993-02	1963-92	1993-02	1963-92	1993-02	1963-92	1993-02	1963-92	1993-02
Adilabad	173.3	186.9	299.0	250.2	304.1	296.1	158.3	133.5	74.0	111.9
Nizamabad	167.3	139.4	297.5	221.0	301.1	275.2	176.9	116.8	73.7	141.3
Medak	137.0	100.2	234.6	164.6	224.4	212.8	171.8	113.5	76.9	126.8
Karimnagar	153.4	124.9	251.5	218.2	236.6	227.9	159.2	115.1	74.3	91.9
Warangal	148.9	126.5	273.9	240.7	227.9	263.8	155.3	134.0	86.1	101.2
Khammam	149.3	137.6	288.2	271.8	252.3	282.4	176.6	144.7	108.0	116.8

taking-up of rainfed crops like cotton, pulses, maize, jowar etc. Similarly, July rainfall will have paramount importance for filling of tanks, reservoirs and also in recharging of ground water. The decrease in July rainfall is of great concern in taking-up of timely transplanting of rice in the North Telangana zone. The decrease in rainfall may adversely affect rainfed crops as the most of the crop will be at flowering to yield formation stage. Any moisture stress in rainfed crops during September will result in drastic reduction in grain yield. The increasing amount of rainfall in the month of October will enable timely sowing of *rabi* crops subsequently which grow on residual moisture in black cotton soils of the zone.

During month of June, in all the districts of North Telangana zone, the dependable rainfall was in increasing trend (Table 2). A spectacular increase in dependable rainfall was observed in Adilabad district followed by Khammam district. In July, all the districts showed increase in dependable rainfall except

Medak where it was on decreasing trend. There was considerable increase in dependability in rainfall in Khammam, Karimnagar and Nizamabad districts. Dependable rainfall decreased in the month of August in the districts of Nizamabad and Karimnagar and it was in increasing trend in other districts of the zone. In the month of September, the dependability decreased in all the districts of the zone except Khammam where slight increase in dependability of rainfall was observed in recent 20 years. The decrease in dependability of rainfall in the month of September is greater concern for rainfed crops particularly maize crop. In maize, moisture stress at silking and tasseling stage will have adverse affect on grain yield. The relationship between grain yield of maize and September rainfall of Medak district indicated that there was a close and positive association between rainfall and final grain yield, which normally coincides with critical reproductive phase i.e., silking and grain filling stages. In all the districts of the zone, the dependability in rainfall increased in the

Table 2: Dependable rainfall(mm) in different districts of North Telangana Zone of Andhra Pradesh

District	June		July		August		September		October	
	1963-82	1983-02	1963-82	1983-02	1963-82	1983-02	1963-82	1983-02	1963-82	1983-02
Adilabad	94.0	128.0	188.9	197.0	178.1	222.0	101.0	60.0	2.3	32.0
Nizamabad	92.0	107.0	178.0	220.0	177.8	167.0	97.0	48.0	5.3	24.0
Medak	77.0	82.0	151.2	134.0	130.0	153.0	123.8	63.0	10.0	20.0
Karimnagar	89.0	104.0	129.3	191.0	150.3	131.0	97.0	67.0	8.6	31.0
Warangal	94.0	99.0	160.3	170.0	137.2	203.0	85.8	64.0	25.0	28.0
Khammam	90.0	110.0	192.8	232.0	135.5	212.0	125.9	132.0	43.5	73.0

Table 3 : Coefficient of variation(%) in rainfall in different districts of North Telangana Zone of Andhra Pradesh

District	June		July		August		September		October	
	1963-82	1983-02	1963-82	1983-02	1963-82	1983-02	1963-82	1983-02	1963-82	1983-02
Adilabad	42.8	41.5	40.4	58.1	46.0	46.2	48.6	71.8	135.3	96.4
Nizamabad	55.7	52.8	42.2	51.6	50.2	56.6	53.5	96.8	123.4	100.1
Medak	40.8	44.0	48.7	65.9	52.0	41.3	48.3	69.3	98.9	78.7
Karimnagar	52.2	46.4	43.9	47.2	38.4	55.7	52.0	57.0	125.0	71.3
Warangal	47.0	45.6	43.5	51.0	39.4	40.8	58.9	56.6	88.2	78.3
Khammam	47.4	40.6	36.1	39.7	46.9	36.1	41.9	40.7	75.5	68.8

month of October. The increase in dependability of rainfall in the month of October will help in timely sowing of the *rabi* crops like chickpea, safflower, coriander and mustard in black cotton soils of the zone.

Coefficient variation (%) decreased in the month of June except Medak where CV has increased (Table 3). In the month of July, the CV has increased in all the districts of the zone. In September CV has increased in Adilabad, Nizamabad, Medak,

Karimnagar and decreased in Warangal and Khammam districts. In all the districts in the month of October, the CV has decreased. The increased CV in the months of July and September is causing concern for rainfed crops as well as irrigated rice in North Telangana zone.

CONCLUSIONS

The decrease in rainfall trend is observed in Adilabad, Nizamabad and Medak in recent years. Dependable rainfall of September month has decreased in all

the districts except in Khammam which may adversely affect rainfed crops particularly maize which will be at flowering to yield formation stage. Increased dependable rainfall in the month of October helps in timely sowing of *rabi* crops.

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