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Trend of Rainfall and Temperature at Yavatmal, Maharashtra

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ABSTRACT

Based on the analysis of 39 years rainfall and temperature data the results revealed that during current decade (2001-09) the seasonal rainfall was decreased along with the rainy days. Also the winter season mean minimum temperature and annual minimum temperature for the current decade (2001-09) wass increased. However, the overall trends for rainfall and temperature are non significant indicating no significant changes in rainfall and temperature at Yavatmal.

Rainfall and atmospheric temperature play a predominant role in crop growth, development and final productivity. Globally, enhancement of the green house effect may have led to changes in the hydrological cycle, such as increased evaporation, drought and precipitation, and it is likely that such would have a higher regional variation. Decreasing trend in monsoon seasonal rainfall was reported over many parts of the country. Due to greenhouse effect air temperatures are increasing and the increase is expected to be 2 to 4 ^{0}C in the next 100 years. Singh and Rai (2011) reported an increasing trend of maximum temperature in all the seasons at Raipur, Madhya Pradesh. Hundal and Kaur (2002) found that in Punjab minimum temperature had increased by about 0.4 ^{0}C at Patiala and 1.6 ^{0}C at Ludhiana. A likely increase of 1 ^{0}C over the central plains of India during the monsoon season (Lal *et al*., 1995) and a greater increase in minimum temperature compared to the maximum (Lal *et al.*, 1996) have been indicated. Analysis of the observed climate records globally has revealed that increase in global mean surface air temperature over land and sea combined of 0.4 to 0.8^{0}C since the late 19th century. Generally both day and night temperatures have risen, although night time temperatures have generally warmed more than day time temperatures.

In view of importance of rainfall and temperature variability on crop productivity, local studies on rainfall and temperature are necessary for making agricultural decisions. Keeping the above in view an attempt was made to study the climatic variability in terms of rainfall and temperature at the Yavatmal location of Maharashtra state.

MATERIAL AND METHODS

A study was undertaken to know the variability in terms of rainfall and temperature at the Yavatmal (20^{0}23' N, 78^{0}8' E and 1496 m MSL) location of Maharashtra state. The rainfall and temperature (maximum & minimum) data was obtained from the Agricultural Research Station (Dr. PDKV), Yavatmal.

The data was divided in to five periods (1971-80, 1981-90, 1991-2000, 2001-2009 and overall period 1971-2009) and trends of seasonal rainfall (moving average of three years) and temperature (Maximum and minimum) were investigated by regression (slope) method. Trend was also examined by testing the significance of slope of the regression line. For this purpose, climatic variables were plotted (Y-axis) against the relative year values. The slope of the plot represents the trend. The slope was then subjected to *t*-test for significance at 5 per cent level (Ali *et al.*, 2007).

RESULTS AND DISCUSSION

Rainfall

The trend of summer season rainfall for overall period (1971-2009) was non significant. However it was significant for the period 1991-2000 and 2001-2009 indicating that the summer season rainfall was decreased over the normal (1971-2000) in the above two periods. Monsoon season rainfall for overall period (1971-2009) and for decennial period (1971-80, 1981-90, 1991-2000 and 2001-2009) was non significant indicating that there is no significant change in the monsoon season rainfall. Post monsoon season rainfall for overall period

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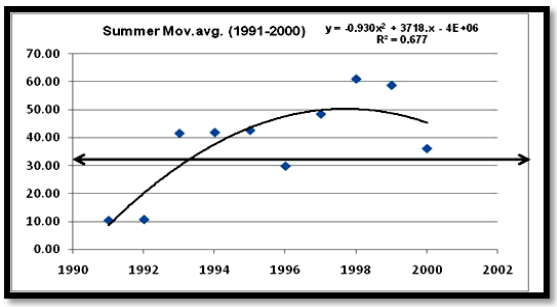
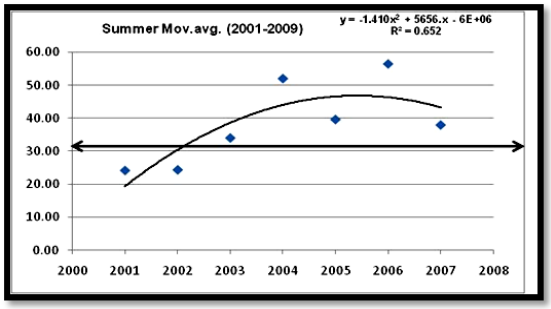
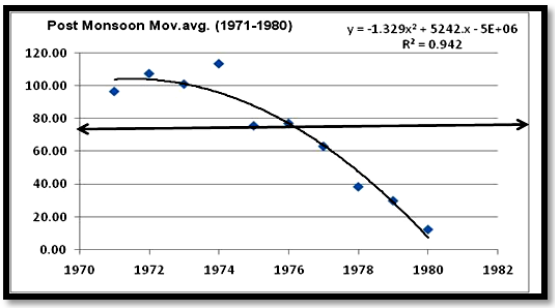


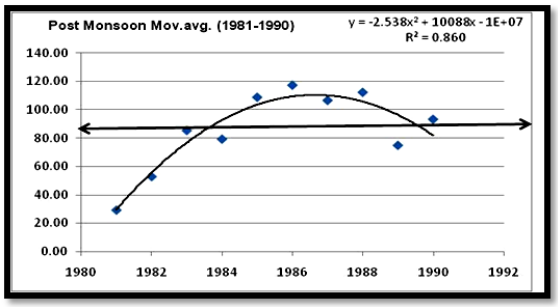
Summer Season 1991-2000



Summer Season 2001- 2009



Post Monsoon Season 1971-1980



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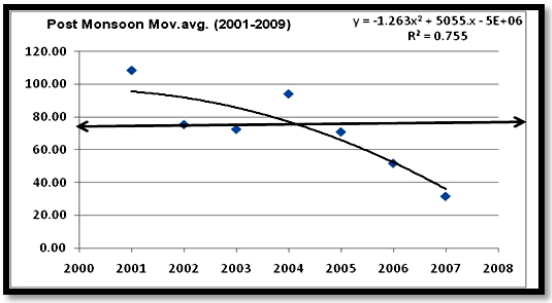
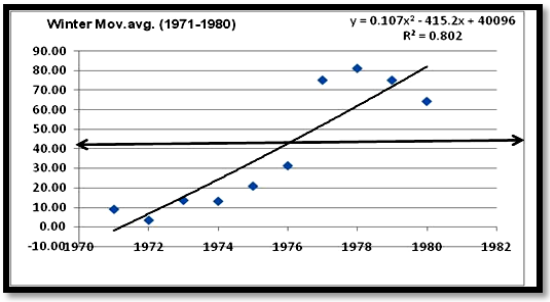
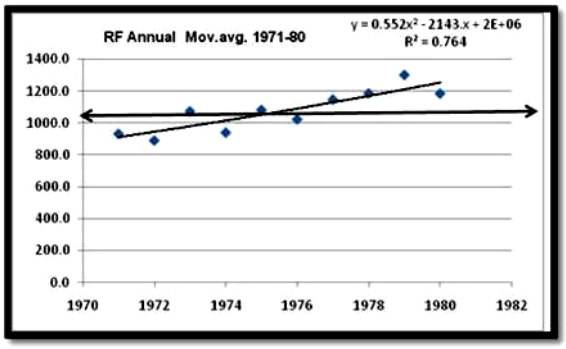


Post Monsoon Season 2001- 2009

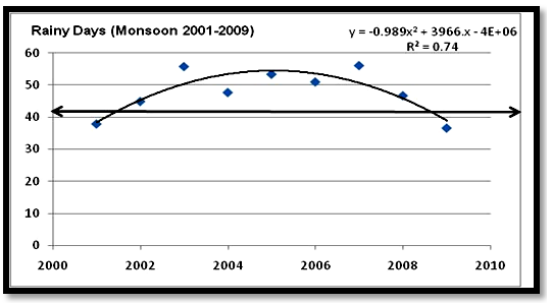


Winter Season 1971-1980

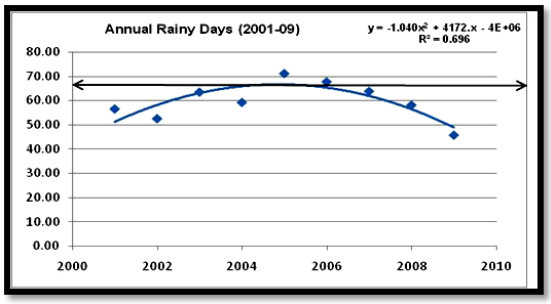


Annual Rainfall 1971-1980

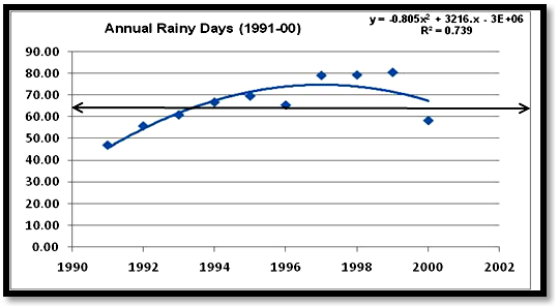
Fig.1: Seasonal Rainfall Trend at Yavatmal



Rainy Days Monsoon Season (2001- 2009)

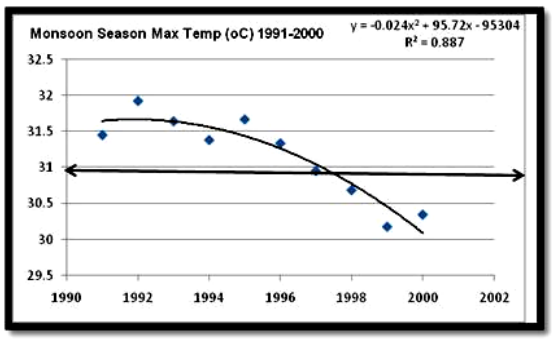


Annual Rainy Days 2001- 2009

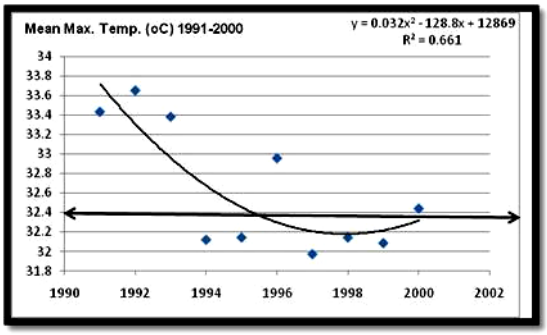


Annual Rainy Days 1991-2000

Fig.2: Seasonal Rainy Days Trend at Yavatmal



Monsoon Season Mean Maximum Temp. (1991-2000)



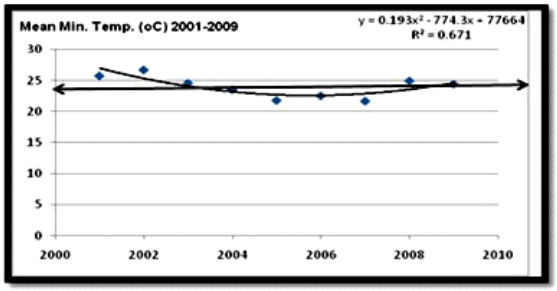
Annual Mean Maximum Temp. (1991-2000)

Fig.3: Seasonal Temperature (Maximum) Trend at Yavatmal

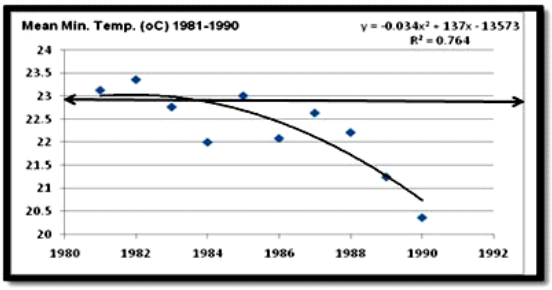
(1971-2009) was non significant but it was significant for the period 1981-90 and 2001-2009 (Fig. 1) indicating that the post monsoon season rainfall was decreased over the normal (1971-2000) in the above three periods. Winter season rainfall for overall period (1971-2009) was non significant. But it was significant for the period 1971-80 (Fig. 1) indicating that the winter season rainfall was increased in the period 1971-80. Annual rainfall for overall period (1971-2009) was non significant although it is significant for the period 1971-80 (Fig. 1) indicating the increase in annual rainfall within the decade 1971-80.

Rainy Days

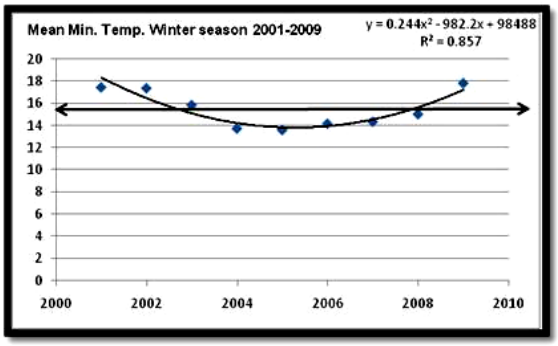
Monsoon season rainy day's for overall period (1971-2009) was non significant, while it was significant for the period 2001-2009 (Fig. 2) indicating the gradual decrease in monsoon season rainy days. Post monsoon season and winter season rainy day's for overall period (1971-2009) and for decennial period (1971-80, 1981-90, 1991-2000 and 2001-2009) were non significant. Annual rainy day's for overall period (1971-2009) was non significant but significant for the period 1991-2000 and 2001-2009 (Fig. 2) indicating the gradual decrease in annual rainy days.



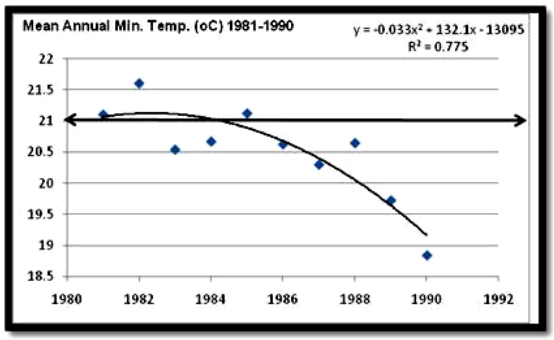
Summer Season Mean Minimum Temp. (2001-2009)



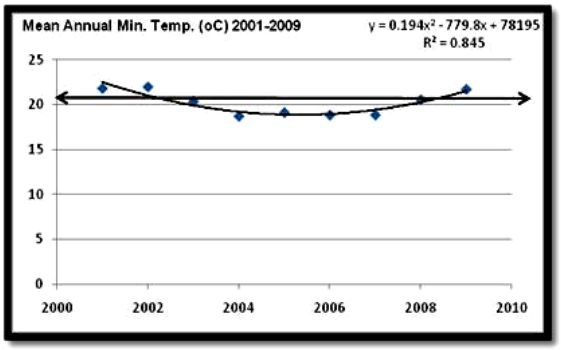
Monsoon Season Mean Minimum Temp. (1981-1990)



Winter Season Mean Minimum Temp. (2001-2009)



Annual Mean Minimum Temp. (1981-1990)



Annual Mean Minimum Temp. (2001-2009)

Fig.4: Seasonal Temperature (Minimum) Trend at Yavatmal

Temperature (Maximum)

Summer season temperature (Max.) for overall period (1971-2009) and for decennial period (1971-80, 1981-90, 1991-2000 and 2001-2009) was non significant. Monsoon season temperature (Max.) for overall period (1971-2009) was non significant although it was significant for the period 1991-2000 (Fig. 3) indicating the gradual decrease in monsoon season temperature (Max.). Winter season temperature (Max.) for overall period (1971-2009) and for decennial period (1971-80, 1981-90, 1991-2000 and 2001-2009) was non significant. Annual temperature (Max.) for overall period (1971-2009) was non significant, while it wass significant for the period 1991-2000 (Fig. 3) indicating the gradual decrease in annual temperature (Max.).

Temperature (Minimum)

Summer season temperature (Min.) for overall period (1971-2009) and for decennial period (1971-80, 1981-90, 1991-2000) was non significant. At the same it was significant for the period 2001-2009 (Fig. 4) indicating rise in summer season

temperature (Min.). Monsoon season temperature (Min.) for overall period (1971-2009) was non significant. Although it was significant for the period 1991-2000 (Fig. 4) indicating the gradual decrease in monsoon season temperature (Min.). Winter season temperature (Min.) for overall period (1971-2009) was non significant but it was significant for the period 2001-2009 (Fig. 4) indicating rise in winter season temperature (Min.). Annual temperature (Min.) for overall period (1971-2009) was non significant but it was significant for the period 1981-1990 and 2001-2009 (Fig. 4) indicating the gradual fall in annual temperature (Min.) during 1981-1990 and gradual rise in annual temperature (Min.) during 2001-2009.

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LITERATURE CITED

Ali M.H., A. K. M. R. Islam and M .G. M. Amin, 2007. Trend of rainfall and temperature in different regions of Bangladesh during last five decades, J. Agrometeorol.,9(1):23-26.

Hundal, S.S and Kaur, P., 2002. Annual and seasonal climatic variability at different locations of Punjab state, J. Agrometeorol, 4(2): 113- 125.

Lal, M., Cubasch, U., Voss, R. and Waszkewitz, J., 1995. The effect of transient increase in greenhouse gases and sulphate aerosols on monsoon climate, Current Sci., 69(9): 752-763.

Lal, M., Srinivasan, G. and Cubasch, U., 1996. Implications of increasing greenhouse gases and aerosols on the diurnal temperature cycle of the Indian subcontinent, Current Sci. 71(10): 746-752.

Singh, K.A., and S.K., Rai., 2011. Long term variability of temperatures over various time-scales at Pusa, Bihar, J. Agrometeorol., 13(1):77-78.

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