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INTER-SEASONAL CORRELATION OF MAXIMUM TEMPERATURE AT COIMBATORE

Balasubramanian and Venkatanarasinga Rao (1949) have worked out inter-monthly correlations of maximum temperature at Coimbatore and established significant relationship between the months of February-March and September-October. With reference to the meteorological factors influencing soil temperature at Coimbatore, Balasubramanian *et al.* (1961) have indicated that the maximum temperature, mean air temperature and relative humidity influence the noon soil temperatures at 3″ and 12″ depths in varying degrees.

In this paper an assessment of the inter-seasonal correlation of the maximum temperature at Coimbatore (11°N, 76·5°E, 1348 ft a.s.l.) has been made on the basis of the data collected in the observatory, situated in the campus of the Agricultural College and Research Institute, for fortyseven years from 1916 to 1962.

Methods—(*i*) The year has been divided into four main periods, as detailed below—

Dry Weather period	: January and February
Hot Weather period	: March to May
Southwest Monsoon period	: June to September
Northeast Monsoon period	: October to December

The inter-period correlations of the means of maximum temperature were worked out for the different periods in the same year and the year as a whole. The levels of significance of the various correlations were assessed. The relevant data are presented in Table 1.

(*ii*) Since the mean maximum temperature of each period is found to be influencing significantly the annual mean of maximum temperature, the contribution of each period to the fluctuation of the annual mean maximum temperature was statistically established by

TABLE 1

Inter-period correlations of mean maximum temperature

Periods	Correlation coefficient (r) and Standard Error (SE)							
	x_1		x_2		x_3		x_4	
	r	SE	r	SE	r	SE	r	SE
x_2	+0·406†	0·136						
x_3	+0·052	0·149	+0·142	0·148				
x_4	+0·283	0·143	+0·325*	0·142	+0·392†	0·137		
Y	+0·555‡	0·124	+0·646‡	0·114	+0·622‡	0·117	+0·628‡	0·116

TALE 2

Analysis of Variance

Variance due to	DF	SS	MS	F
Regression function	4	16·24	4·06	58·00†
Deviation from regression function	42	2·83	0·07	
	46	19·07		

Note—Significance at 5 per cent, 1 per cent and 0·1 per cent are indicated by *, † and ‡ respectively

working a multiple regression equation, namely,

$$y = 11{\cdot}23 + 0{\cdot}174x_1 + 0{\cdot}220x_2 + \\ + 0{\cdot}295x_3 + 0{\cdot}183x_4$$

where y=annual mean maximum temperature and x_1, x_2, x_3 and x_4 are respectively the mean maximum temperatures of the dry weather, hot weather, southwest monsoon and northeast monsoon periods. The F-test shows significance at the 1% level and the value of multiple correlation coefficient R is 0·923. The analysis of variance is given in Table 2.

It is seen that the CCs between x_1 and x_2, x_2 and x_4 and x_3 and x_4 are positive and significant indicating the extent of dependence of maximum temperature of a season on the maximum temperature of the previous seasons. The correlation between the mean maximum temperature of each period and the annual mean maximum temperature is positive and highly significant at the level of P—0·001. This indicates that the variation in annual mean maximum temperature is a slow process, covering entirely all the twelve months of the year. This inference is also supported by the above three significant inter-period correlations.

The multiple regression equation presented in Table 2 reveals that the partial regression coefficient attached to the southwest monsoon period is the highest, which indicates that this period covering one third of the year — June to September — exerts the maximum influence on the annual mean maximum temperature.

Conclusion

The inter-period correlations are positive and significant only between Dry Weather and Hot Weather periods, Hot Weather and Northeast Monsoon periods and Southwest and Northeast Monsoon periods. But the mean maximum temperature in each period significantly influence in a positive manner the annual mean maximum temperature.

It is possible to forecast the severity of the summer in any year from a knowledge of the mean maximum temperature in the first two months of that year. Further, it is observed that the mean maximum temperature in the southwest monsoon period determines the nature of the annual mean maximum temperature.

Agriculturally these inferences will have immense practical value in determining the irrigation schedule for the various cultivated garden land crops, as any fluctuation in maximum temperature will have its associated effect on soil temperature and soil moisture.

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October 23, 1963

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