A preliminary note on the statistical analysis of the maximum temperatures at Coimbatore

By

C. BALASUBRAMANIAN, B. A., B. Sc., (Ag.)
Agricultural Meteorologist, Coimbatore

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M. B. VENKATANARASINGA RAO, B. A., B. Sc., (Ag.) A. I. A. R. I.
Paddy Specialist, Coimbatore

Introduction: "Climate and weather are as decisive in the development of a plant as home surroundings are in the life of a growing child" (5). The truth of this statement can be understood well if temperature, moisture and light having maximum influence on plant life, are analysed for their relative importance, individually as well as collectively. Every Agricultural worker knows that these three factors always work together to produce a given effect.

It is proposed to confine the discussion in this paper only to *temperature* and its influence on plant growth. Temperature has got both direct and indirect effects on the performance of a plant, directly by affecting its physiological process and indirectly by the spread or inhibition of its diseases. The killing effect of low temperatures, stem lesions and plant diseases caused by excessive heat, diseases due to low temperatures and sun-scalds, and winter-injuries of fruit trees are some of the well-known instances of the influence of temperature on plant growth. It may even go to the extent of controlling duration and seasonal growth habits in some of the cultivated cereals, as for instance, wheat.

Since temperature is an important weather factor controlling the growth and yield of cultivated crops, the statistical analysis of the daily maximum temperatures recorded at 0822 hours in the observatory attached to the Agricultural College & Research Institute, Coimbatore for a period of 36 years (1913 — 1948 both inclusive) has been taken up for detailed study.

Statistical Analysis: (i) The monthly means of maximum temperatures and their corresponding standard deviations and coefficients of variability were evaluated and are given in Table I, season-war. (ii) The twelve inter-monthly correlations with their corresponding standard errors are given in Table II. (iii) (a) Since the correlations between the monthly means of maximum temperatures of *February and March & September and October* are positive and significant, the weekly means of the maximum temperatures of these four months were studied in detail. Table III contains the weekly means of maximum temperatures and their Standard

Deviations and Coefficients of Variability. (iii) (b) The correlations between the various weekly means of temperatures of these four months and their corresponding regressions and nature of significance were worked out. At the beginning of summer, the inter-weekly correlations were found to be highly significant, practically throughout February and March. The possible explanation to the existence of this high positive correlation is the ideal weather condition created by clear skies, feeble air movement and absence of clouds and precipitation', characteristic of the beginning of the summer season. In regard to September and October correlations unexpected weekly combinations of significance were noted and assigned to the onset of the north-east Monsoon.

Interpretiation and Inference: (i) *Table I. Monthly means of maximum temperatures, their standard deviations and coefficients of variability*, (a) Maximum temperature is highest in April and lowest in December. (b) Summer commences in February and lasts upto May. The steady and low value of standard deviation and coefficient of variability for the months of February, March and April indicate that during the summer season, fluctuation in maximum temperature is negligible,

The co-efficient of variability varies from 1·41 to 5·44. It is highest in May, followed by that in June indicating thereby the unsteady nature of weather and the setting in of the south-west Monsoon. Its behaviour is similar in October and November, showing thereby that the north-east Monsoon is commencing. Sudden rise in January points out the withdrawal of the north-east Monsoon.

During the monsoonic periods, May–June to September and October–November to beginning of January, the changes in the co-efficient of variability are very sharp, due to the uncertain weather conditions characteristic of these two main rainy seasons at coimbatiore.

(ii) *Table II. Inter-monthly correlations and their significance.* (a) Barring the two combinations, namely, February–March and September–October, all the other ten inter-monthly correlations are not significant. (b) Towards the end of summer and at the time of the commencement of the south-west and north-east Monsoons and during the north-east Monsoon period, negative correlation exists thereby indicating the approach of the unsteady weather conditions.

(iii) *Table III Weekly means of maximum temperatures and their standard deviations and co-efficients of variability (February, March, September & October).* (a) The steady rise of the weekly maximum temperatures during the months of February and March is a characteristic feature of the commencement of the summer. (b) The fairly uniform mild rise in the weekly means of maximum temperature in September

and slow decrease in the weekly means of maximum temperature in October point out the setting of the monsoonic weather conditions. (c) In October first week (September 29th to October 5th), co-efficient of variability is maximum, thereby indicating the setting in of the north-east Monsoon. The fairly high and uniform co-efficients of variability in the third and fourth weeks of October confirm that the north-east Monsoon has become steady.

Summary and Conclusion.

1. The nature and types of the correlations, both monthly and weekly, have been analysed in detail. 2. When data for a further period are collected, regression equations can be worked out to forecast the maximum temperature in a particular week based on the knowledge of the maximum temperatures prevailing the weeks preceding. The value of such a forecast is too well-known, particulary to an agriculturist, who is always noted for his eagerness to know the weather conditions in advance. 3. Summer commences in February and lasts upto May. During this period, fluctuation in maximum temperature is found to be negligible. This information regarding the duration and severity of summer at Coimbatore will be of immense use to the farmers of Coimbatore for adjusting suitably their cultural operations. 4. The following details regarding the periods of onset and withdrawal of the two main Monsoons at Coimbatore are brought to light by this preliminary analysis: (a) South-West Monsoon sets in June and continues upto September. (b) North-East Monsoon commences in October and withdraws in January.

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TABLE I.—36 Years Data.

Serial No.	Name of the month	Monthly Mean Max. Temp. °F	Standard Deviation S. D.	Co-efficient of Variations %
	Hot Weather Period.			
1.	February	90·1	1·85	2·05
2.	March	94·8	1·74	1·83
3.	April	95·7	1·70	1·77
4.	May	94·5	5·14	5·44
	S. W. Monsoon Period.			
5.	June	88·7	4·24	4·78
6.	July	86·4	2·81	3·25
7.	August	87·6	1·54	1·76
8.	September	89·1	1·99	2·23
	N. E. Monsoon Period.			
9.	October	87·5	2·41	2·76
10.	November	84·5	2·23	2·63
11.	December	83·6	1·18	1·41
12.	January	85·1	2·07	2·44

TABLE III.—36 Years Data.

Serial No.	Details regarding the week	Weekly Mean Max. Temp. °F	Stand. Dev. S. D.	Coeff. of Var. %
	Commencement and early part of summer: Feb. — March.			
1.	Feb. 1st week 1 to 7 ...	88·1	3·68	4·17
2.	,, 2nd ,, 8 to 14 ...	88·8	4·52	5.09
3.	,, 3rd ,, 15 to 21 ...	90·7	4·41	4·86
4.	,, 4th ,, 22 to 28* ...	91·5	4·80	5·25
5.	March 1st week 1 to 7 ...	93·0	3·07	3·30
6.	,, 2nd ,, 8 to 14 ...	94·3	2·65	2·81
7.	,, 3rd ,, 15 to 21 ...	95·0	3·97	4·18
8.	,, 4th ,, 22 to 28 ...	95·5	4·30	4·51
	Commencement of North-East Monsoon: Sept. — Oct.			
9.	Sept. 1st week 1 to 7 ...	88·9	3·89	4·37
10.	,, 2nd ,, 8 to 14 ...	89·1	2·75	3·08
11.	,, 3rd ,, 15 to 21 ...	89·4	3·89	4·35
12.	,, 4th ,, 22 to 28 ...	89·5	3·94	4·40
13.	,, 29th to Oct. 5th (Oct. 1st week) ...	88·7	6·62	7·47
14.	Oct. 2nd ,, 6 to 12 ...	88·5	4·35	4·91
15.	,, 3rd ,, 13 to 19 ...	87·6	5·66	6·47
16.	,, 4th ,, 20 to 26 ...	87·1	6·18	7·10

* In leap years, February 4th week covers 8 days.

TABLE II.

Correlation between the monthly means of maximum temperatures—Agricultural College and Research Institute, Coimbatore.

Serial No.	Details of the correlations worked out	Corr. coeff. r.	Stand. Error S. E.	Corr. significant or not
1.	Between Jan. and Feb. ...	+0·2695	0·1651	No.
2.	,, Feb. and March ...	+0·3939	0·1576	Yes.
3.	,, March and April ...	+0·2286	0·1669	No.
4.	,, April and May ...	—0·0319	0·1714	No.
5.	,, May and June ...	+0·2296	0·1669	No.
6.	,, June and July ...	—0·0079	0·1715	No.
7.	,, July and August ...	+0·2757	0·1648	No.
8.	,, Aug. and Sept. ...	+0·2020	0·1680	No.
9.	,, Sept. and Oct. ...	+0·4639	0·1519	Yes.
10.	,, Oct. and Nov. ...	—0·1128	0·1704	No.
11.	,, Nov. and Dec. ...	—0·0212	0·1716	No.
12.	,, Dec. and Jan. ...	+0·1803	0·1687	No.

Gardenland cultivation around the Agricultural College, Coimbatore

By

K. MEENAKSHISUNDARAM

Assistant in Economics, Agricultural College

Nowhere else can we find such a sudden and spectacular improvement in the expansion of gardenland cultivation, i. e. farming under well irrigation, as in the Coimbatore district, in recent years. A large area under dry lands have been converted into gardenland by sinking new wells. Starting with a small nucleus gardenland holding, many have acquired, consolidated and enlarged their holdings. Neighbouring drylands have been purchased, often at high prices and added to their holdings. Old wells have been deepened and widened, if the water supply is promising. Investments of Rs. 5,000/- to Rs. 10,000/- per well is not quite uncommon in this district. It is the advent of cheap electricity from the Hydro Electric Power Scheme of Pykara, some fifteen years