

Monsoons in Coimbatore :

by

C. BALASUBRAMANIAN
Agricultural Meteorologist

Introduction : The locality where the Agricultural College and Research Institute is situated is within ten miles from the "Palghat gap", which is about forty miles from the Arabian sea. It is purely an inland area with mountains on the north, west and southern sides. The Vellingiri hills on the west, within a distance of about twelve miles, function as a rampart against the South-west monsoon.

The daily rainfall data collected in the observatory, attached to the Agricultural College and Research Institute, for a period of fifty years from 1907 have been critically examined to assess the probable dates of the onset, duration of activity and the nature of pattern of rainfall during the south-west, and the north-east, monsoon periods of June to September and October to December respectively. With the details collected regarding the dates of onset of the monsoons, an onset diagram was prepared to bring out the probable periods of the onset of these two monsoons. The cyclic nature of the performance of these two monsoons has been assessed by adopting the 'Centre Shift Average Method' for periods of one, two, three etc. up to eighteen years. In addition, the relationship between the patterns of rainfall in these two monsoons and their individual relationship with the annual pattern of rainfall were also worked out. Incidentally the nature of the break periods between the two monsoons has also been examined.

Discussion : (i) The data presented in Table I will indicate that during the period of north-east monsoon, which is otherwise known as 'Retreating Monsoon', nearly half the quantity of the total annual precipitation is received, whereas it is even less than one third of the total annual precipitation in the south-west monsoon period, which is the main monsoon period. In regard to distribution of rainfall it works out to four and six days per month on an average respectively for the south-west, and north-east monsoon periods. As regards the activity of the two monsoons, October and November are the rainiest months at Coimbatore, giving practically 45.9% of the total annual rainfall, indicating thereby that only during the north-east monsoon period heavy showers are likely to occur and not in the south-west monsoon period, which as already stated above, records only 30.1% of the annual rainfall in a period of four months.

Range of variation of the duration of the south-west monsoon is less compact than that of the north-east monsoon. But it is evident that sporadic heavy downpours may occur in both the monsoons.

(ii) An examination of the onset diagram may reveal the probable periods of onset of these two monsoons. With reference to the south-west monsoon it looks as though that it is likely to set in on any day from 10th May and the setting may even be as late as July, 15th. But its probable period of onset seems to be within the period May 14th to June 4th. Out of fifty years, the onset was not clear and of usual vigour in 1908. So in the remaining forty-nine years the period covered by the days May 14th to June 4th has proved to be the probable onset period in thirty-three years. When data for some more years are collected, it may be possible to fix this probable period of the onset of the south-west monsoon in a more precise manner.

As regards the North-east monsoon it may set in on any day on or after September 29th. But the period constituted by the first twelve days in October seems to be the probable period of onset of this monsoon. In 42 out of 50 years the monsoon has set within this adjustment period. It is, therefore, possible to predict the onset of this monsoon within this period with a certainty of 84%.

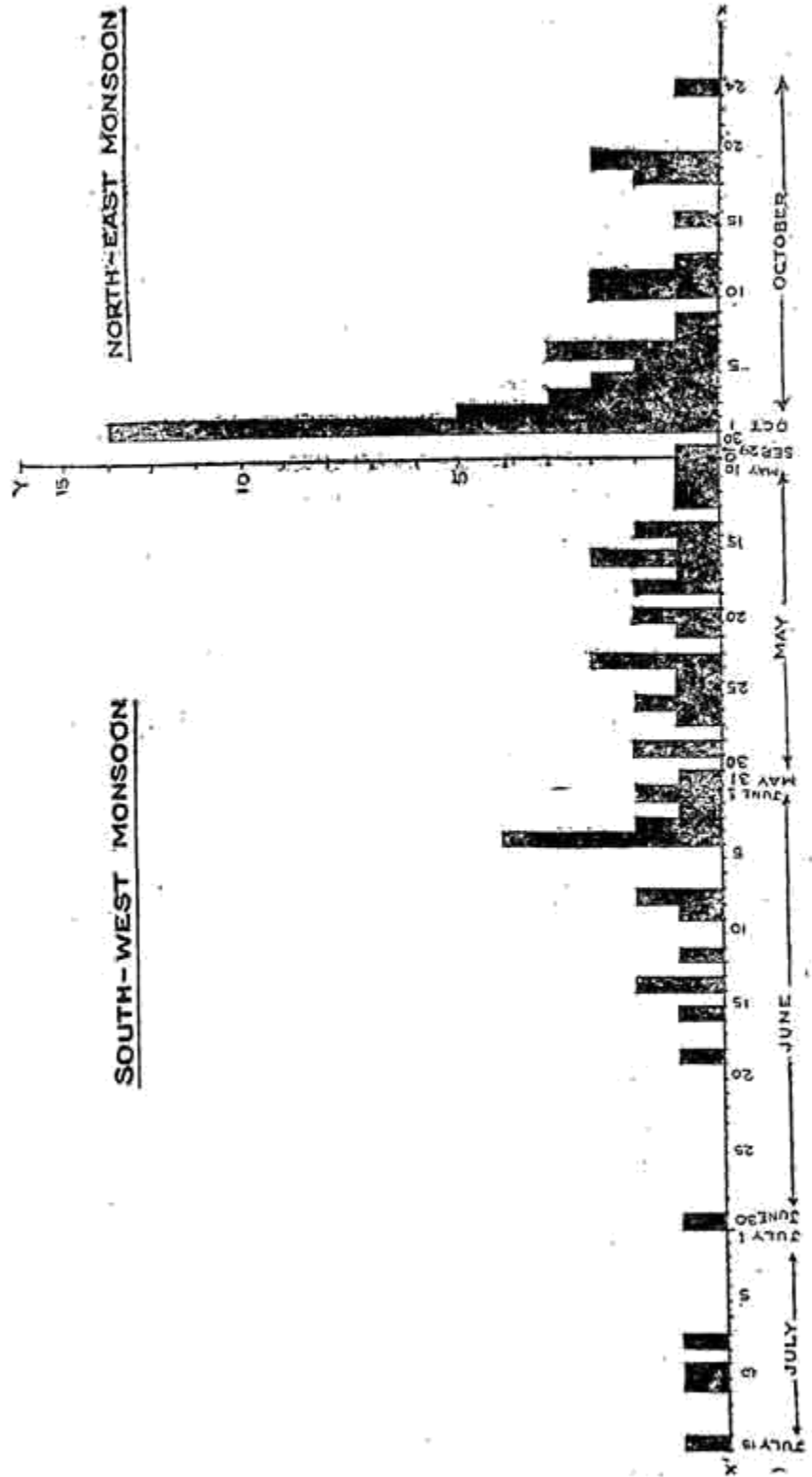
Another interesting feature of these two monsoons at Coimbatore is that the break period between them is either nil or within ten days, in 27 years out of 49 years, as in one year, i. e. in 1908 neither the onset nor the cessation of the South-west monsoon was clear. In the remaining twenty two years it varies from 11 to 34 days. It may, therefore, be tentatively inferred that the retreating monsoon closely follows the cessation of the main monsoon.

(iii) In Table II, the standard deviation, co-efficient of variation, and standard error for the different sets of centre shift averages of total precipitation in the two monsoon periods are given separately for each monsoon for periods of one, two, three etc., upto eighteen years. In the case of the south-west monsoon the co-efficient of variation has the lowest value for the eight years period and then increases and subsequently fluctuates in an unsteady manner, indicating thereby that this monsoon appears to have a cycle of variation of eight years duration. This means that this monsoon is likely to fail once in eight years.

Coming to the North-east monsoon the value of the co-efficient of variation is lowest for periods of fourteen and fifteen years. So this monsoon is likely to fail once in fourteen or fifteen years.

ONSET PERIODS OF MONSOONS AT COIMBATORE

SCALE:-
 OX AND OX' - 1" = 6 DAYS
 OY --- - 1" = 2 ONSETS
 1" IS OP 12 SMALL DIVISIONS



The tentative inference drawn in this connection is that the rains in the North-east monsoon period are more dependable in quantity than those in the South-west monsoon period.

(iv) The relationship existing between the pattern of rainfall, i.e., total quantity and number of rainy days (a day with 10 cents and above of rain is taken as a rainy day) in these two monsoons and their individual relationship with the annual pattern of rainfall was assessed by working simple correlations. The tentative inferences are given below :—

(a) There is no relationship between the patterns of rainfall in these two monsoon periods.

(b) The relationship between the pattern of rainfall in the South-west monsoon period and the whole year is positive and highly significant even for the level of $P = 0.001$.

Rainfall $r = + 0.5744 \pm 0.1182$.

Rainy days $r = + 0.7079 \pm 0.1019$.

(c) The pattern of rainfall in the North-east monsoon period is significantly related with the annual pattern of rainfall. The relationship in quantity is highly significant even at the level of $P = 0.001$, while that of the rainy days is significant only from the point of view of r being greater than 2. S. E. in value.

Rainfall $r = + 0.7294 \pm 0.0987$

Rainy days $r = + 0.4042 \pm 0.1320$

Summary and Conclusion : (i) The North-east monsoon period is more well-defined than that of the South-west monsoon.

(ii) The periods from May 14th to June 4th and October 1st to October 12th are the probable periods of onset of the South-west and North-east monsoons respectively

(iii) The South-west and north-east monsoons have an inherent tendency to fail once in 8 years and 14 to 15 years respectively. The longer cycle of the North-east monsoon indicates that it is more dependable for rains than the South-west monsoon.

(iv) The patterns of rainfall in these two monsoon periods have no relationship between them; but they individually influence considerably the annual pattern of rainfall.

Acknowledgment : The author is grateful to Sri T. Natarajan, Agronomist and Professor of Agriculture, for his valuable guidance. His thanks are also due to Kumari T. P. Anna for her help in the compilation of the data.

TABLE I
Details of the Monsoon at Coimbatore (Fifty years data: 1907 to 1956)

No	Details	South-west		North-east		Remarks.
		monsoon period (June to Sept.)	monsoon period (October to Dec.)	monsoon period (June to Sept.)	monsoon period (October to Dec.)	
1	Average rainfall in inches	7.4	11.9			
2	Percentage on annual average rainfall	30.1	48.4			
3	Range of variation of the monsoon rainfall in inches	2.3 to 25.5	4.8 to 28.0			
4	* Average number of rainy days	17	18			* Rainy day — a day with 10 cents & above of rainfall
5	Percentage on annual average number of rainy days	37.8	40.0			
6	Range of variation of rainy days	6 to 38	8 to 30			
7	Duration of the activity of the monsoon in days	115	72			
8	Range of variation of the duration	59 to 139 *	38 to 89			* Due to the early onset of the monsoon in the second week of May in some years.
9	Heaviest rainfall in inches recorded during the monsoon periods with dates	5.75" on 9-6-1941	4.46" on 3-11-1940			

TABLE II
*Cyclic Nature of the South-West and North-East Monsoon
 Rainfall at Coimbatore*

Central Shift Average for periods of	South-west monsoon rainfall		North-east monsoon rainfall		Remarks.
	S. D.	C. V.	S. D.	C. V.	
1 One year	3.9	52.7	4.7	39.5	0.7
2 Two years	2.8	38.4	3.4	28.6	0.5
3 Three "	2.2	30.6	2.8	23.5	0.4
4 Four "	1.8	25.4	2.4	20.2	0.3
5 Five "	1.4	20.3	2.1	17.6	0.3
6 Six "	1.3	19.1	1.8	15.1	0.3
7 Seven "	1.2	18.1	1.7	14.2	0.3
8 Eight "	0.9	13.8	1.5	12.5	0.2
9 Nine "	1.0	15.4	1.3	10.8	0.2
10 Ten "	0.9	14.5	1.1	9.1	0.2
11 Eleven "	0.9	14.8	0.8	6.6	0.1
12 Twelve "	0.9	15.3	0.6	4.9	0.1
13 Thirteen "	0.8	10.5	0.5	4.1	0.1
14 Fourteen "	0.7	9.2	0.4	3.3	0.1
15 Fifteen "	0.7	9.2	0.4	3.3	0.1
16 Sixteen "	0.7	9.2	0.5	4.1	0.1
17 Seventeen "	0.7	9.1	0.5	4.1	0.1
18 Eighteen "	0.6	7.8	0.6	5.0	0.1