

## Probability analysis of rainfall and evolving cropping system for Coimbatore

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सार — आई० बी० एम० कम्प्यूटर में अपूर्ण गामा बंटन निर्देश का उपयोग करके साप्ताहिक योगों के लिए कोइम्बटूर केन्द्र के 70 वर्षों के दैनिक वर्षण आंकड़ों की गणना की गई है। विभिन्न प्रायिकता स्तरों सहित साप्ताहिक वर्षा की संभावित राशि एवं वर्षा की दी हुई राशि की प्राप्ति की प्रायिकता को ज्ञात करके प्रस्तुत किया गया है। इन आंकड़ों से वर्षा की शुरुआत, सूखे की अवधि, उगाने के मौसम की अवधि और उगाने के मौसम की समाप्ति का संकेत मिलता है। 50 प्रतिशत प्रायिकता स्तर पर संभावित वर्षा के आधार पर कोइम्बटूर के लिए उपयुक्त फसल उगाने की प्रणाली का सुझाव दिया गया है।

ABSTRACT. The daily precipitation data of Coimbatore centre for a period of 70 years were computed for weekly totals by fitting incomplete gamma distribution model in an IBM computer. The assured weekly rainfall amounts with different probability levels and the probability of receiving a given amount of rainfall were worked out and presented. The data indicate the likely commencement of rains, period of drought, length of growing season and end of growing season. Based on the assured rainfall at 50 per cent probability level suitable cropping system was suggested for Coimbatore.

### 1. Introduction

The State of Tamil Nadu faces the natural constraints to agricultural production, especially in the rain-shadow region of Western Ghats where the annual rainfall is meagre and year to year vagaries are large. The amount and distribution of rainfall mainly determine the choice of the crop and cultivating practices of a locality. For developing dryland agriculture on a firm scientific basis, adequate data on rainfall climatology have to be built up. This will enable evolution of modified cropping system to make optimum use of the actual moisture availability periods in problem rainfall areas.

It is, therefore, more realistic to go in for some suitable method of fitting frequency distribution and compute rainfall amounts that can be expected at particular probability level. The assured rainfall amounts can provide a basis for model which may define the likely commencement of rains, periods of drought, end of growing season etc and cropping practices to maximise the production in a defined growing seasons may then be planned (Venkataraman 1979). In this paper the weekly rainfall at 50 per cent probability level was computed for Coimbatore and suitable cropping system was suggested based on the distribution of rainfall.

### 2. Materials and methods

The daily rainfall data of Coimbatore centre for a period of 70 years (1907-76) were computed for

weekly totals by fitting incomplete gamma distribution probability model in an IBM computer (Sarker *et al.* 1978). The assured weekly rainfall amounts with 50 per cent probability level has been taken as a measure of the adequacy of dependable precipitation and featured in Table 1 with corresponding mean weekly rainfall.

### 3. Results and discussion

In Coimbatore a major part (50 per cent) of the annual rainfall is received in northeast monsoon (Oct-Dec). It is observed that the southwest monsoon (Jun-Sep) rains are not assured to raise a successful crop under rainfed condition. Highest rainfall peak is noticed in October/November. In the rest of the period there is no high peak of rainfall. The prominent peak is observed in 42nd week when lowest assured rainfall amount is 30.8 mm at 50 per cent probability level. The period with assured rainfall greater than 10 mm at 50 per cent level were from 40th week to 48th week and thereafter it decreases. This part of the year seems to be wet continuously without any dry spell and a successful short duration crop may be raised during this part of the year.

In summer season (Mar-May) it is seen from last week of April till the end of third week of May is a period with high rainfall but the length of growing season is just sufficient to raise only a very short duration pulse crop, viz., greengram or blackgram.

TABLE 1

Weekly precipitation in mm at 50 per cent probability level  
Coimbatore (11° N, 77° E, 426 m m.s.l.)

Std. wk. No.	Dates	50% probab. (mm)	Mean (mm)
1	1-7 Jan.	3.3	6.35
2	8-14 "	3.5	5.05
3	15-21 "	2.1	2.92
4	22-28 "	1.6	1.46
5	29-4 "	1.8	1.59
6	5-11 Feb	1.8	2.12
7	12-18 "	1.3	0.61
8	19-25 "	1.8	1.74
9	26-4 "	2.0	2.69
10	5-11 Mar	1.2	0.40
11	12-18 "	2.5	3.59
12	19-25 "	2.4	3.14
13	26-1 "	2.8	3.91
14	2-8 Apr	4.2	6.82
15	9-15 "	6.5	10.97
16	16-22 "	6.8	10.60
17	23-29 "	9.3	15.28
18	30-6 "	8.2	12.56
19	7-13 May	9.2	16.18
20	14-20 "	11.3	18.75
21	21-27 "	8.3	14.18
22	28-3 "	6.2	8.94
23	4-10 Jun	6.3	10.65
24	11-17 "	5.5	7.40
25	18-24 "	4.6	6.27
26	25-1 "	5.7	8.58
27	2-8 Jul	7.3	10.16
28	9-15 "	7.2	9.81
29	16-22 "	8.2	14.24
30	23-29 "	8.4	12.06
31	30-5 "	5.0	6.68
32	6-12 Aug	5.7	8.59
33	13-19 "	4.9	7.38
34	20-26 "	4.2	6.38
35	27-2 "	4.5	7.04
36	3-9 Sep	3.6	4.79
37	10-16 "	3.8	5.28
38	17-23 "	6.9	11.00
39	24-30 "	8.2	13.40
40	1-7 Oct	13.5	19.67
41	8-14 "	20.8	34.44
42	15-21 "	30.8	42.05
43	22-28 "	26.7	42.75
44	29-4 "	24.4	39.52
45	5-11 Nov	20.2	34.88
46	12-18 "	14.0	23.87
47	19-25 "	10.1	19.86
48	26-2 "	9.5	18.82
49	3-9 Dec	8.7	16.18
50	10-16 "	4.6	9.17
51	17-23 "	3.2	4.10
52	24-31 "	2.5	3.10

During southwest monsoon 29th and 30th weeks are the only periods in which assured rainfall of more than 8 mm are received and the rest of the period gets meagre rainfall. The period of stress is observed from 22nd to 28th week and from 31st to 38th week. This makes the crop production unsuccessful during southwest monsoon period. The rainfall is utilised in preparing the land for sowing the crops subsequently. It helps to keep the land free from weeds and to conserve moisture.

The assured rainfall in the northeast monsoon period (Oct-Dec) and the length of the growing season is from 40th to 49th week without any dry spell whatsoever. The optimum time of sowing rainfed crop is around 40th week and the soil moisture may be available upto end of December or even beyond this month. The farmers of this locality usually sow a millet crop like sorghum of local variety. It is suggested to sow improved sorghum variety like IS 3541, Kovilpatty Tall or COH 3 hybrid. Instead of growing a pure crop of sorghum it is recommended to mix sorghum with pulses like CO 3 redgram or CO 3 cowpea. In case the onset of northeast monsoon is delayed, sowing of chickpea (Bengal gram) is suggested in black soil and horsegram in red soil areas.

#### 4. Conclusion

The daily precipitation data of Coimbatore centre for a period of 70 years were computed for weekly totals at 50 per cent probability level. The data indicate the likely commencement of rains as 40th week and the length of growing season as 40th to 49th week without any stress period.

The important features revealed by the above study are that continuous maximum assured rainfall at 50 per cent probability level is received during the northeast monsoon period. It is the longest wet period during which a successful rainfed crop can be raised. Growing of improved sorghum varieties mixed with pulses is recommended to suit the rainfall pattern of Coimbatore centre.

#### References

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