

## RAINFALL BASED CROPPING SYSTEM IN UPLAND CONDITIONS OF GANJAM, ORISSA

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### ABSTRACT

The daily rainfall data for the 15 years (1974-1988) recorded at Agricultural Meteorological observatory, Berhampur, Ganjam, were analysed for annual, seasonal, monthly and weekly periods and presented in this paper. Based on the rainfall pattern, a suitable cropping system of growing cowpea fodder, pigeonpea or ground nut, sesamum, horsegram, greenmanure as main crops and fingermillet and greengram as inter crops have been suggested with minimum risk to utilise the rainfall efficiently for increasing the income of the farmers.

KEY WORDS : Rainfall, Analysis, Cropping system.

The uplands in Ganjam district faces a moisture stress for stable agricultural production. Hence for evolving a profitable cropping system in rainfed tracts on a rational scientific basis, rainfall analysis is highly essential. The rainfall data of Berhampur Agricultural Research Station located in Ganjam district have been taken up for the study. The research station is situated geographically at 84° 54' East longitude and 19° 18' North latitude with an altitude of 34 m above mean sea level. Kulandaivelu *et al.* (1980) and Panchanathan *et al.* (1987) analysed the rainfall data of Coimbatore and Aruppukottai respectively and reported suitable cropping patterns. This paper deals with the analysis of rainfall data and presentation of a suitable cropping system.

### MATERIALS AND METHODS

The daily rainfall data for the 15 years (1974-1988) recorded at Berhampur Agricultural Meteorological observatory are used in the study. The data were analysed statistically for annual, seasonal, monthly and weekly as suggested by Kulandaivelu *et al.* (1980) and are presented.

### RESULTS AND DISCUSSION

#### Annual Rainfall

The mean annual rainfall for the 15 years worked out to 1080 mm in 56 rainy days. The coefficient of variation was only 17 per cent thus indicating not much variation with annual rainfall. The maximum rainfall of 1394 mm was recorded in 57 rainy days in 1986 and the minimum of 705 mm in 47 days during 1982. The rainfall was above normal in nine years, below normal in five years and at par in one year (Table 1).

#### Seasonal Rainfall

The distribution of rainfall with four season with percentage over annual rainfall and the degree of dependability are furnished in Table 2.

Southwest Monsoon amounted for maximum rainfall of 68 per cent (734 mm) of the total followed by North East Monsoon contributing 21 per cent (231 mm), Summer 8 per cent (89 mm) and winter 3 per cent (26 mm). The dependability of receiving the rains from Southwest Monsoon was more (C.V.48%) compared to other periods. In winter season, the rainfall was mostly undependable (C.V. 182%) (Table 2).

**Table 1.** Annual rainfall (mm) in Ganjam, Orissa (1974-1988).

Year	R.F. (mm)	R.D. (Days)	Year	R.F. (mm)	R.D. (Days)
1974	992	47	1982	705	47
1975	1111	68	1983	1299	54
1976	886	64	1984	916	54
1977	1118	65	1985	1143	57
1978	1339	75	1986	1394	57
1979	794	55	1987	1064	36
1980	1163	55	1988	1153	49
1981	1127	57			

Annual mean rainfall (R.F.) - 1080mm  
 Rainy days (R.D.) - 56  
 Coefficient of variation - 17%

**Table 2.** Season wise distribution of rainfall (1974-1988).

Season	Rainfall (mm)	Percent over Annual rainfall	Rainy days.	C.V. per cent
Winter (Dec.-Feb.)	26	3.0	2	182
Summer (March-May)	89	8.0	7	101
SW Monsoon (Jun.-Sep.)	734	68.0	37	48
NE Monsoon (Oct.-Nov.)	231	21.0	10	93
	1080	100.0	56	17

Table 3. Mean monthly rainfall(mm) in Ganjam, Orissa (1974-1988).

Month	Rainfall (mm)	Per cent contribution over annual	Rainy days	C.V. per cent
January	4.7	0.4	0.3	181
February	16.9	1.6	1.0	131
March	31.0	2.9	1.7	113
April	23.8	2.2	2.0	108
May	34.6	3.2	2.9	79
June	143.3	13.3	7.1	35
July	171.3	15.9	9.7	48
August	216.1	20.0	10.5	44
September	203.2	18.8	10.3	47
October	170.7	15.8	7.5	53
November	60.7	5.6	2.7	170
December	4.0	0.4	0.3	180
	1080.3	100.0	56.0	17

### Monthly Rainfall

August and September are the months of heaviest rainfall contributing 216mm and 203mm respectively sharing 35 per cent of the annual rainfall. Mean monthly rainfall, rainy days, their contribution to the annual rainfall and the coefficient of variation are given in Table 3. The dependability of receiving the rainfall is highest in the month of June (C.V. 35%) followed by August (C.V. 44%), September (C.V. 47%) and July (C.V. 48%).

### Weekly Rainfall

The data indicated that the rainfall received from 15th week to 22nd week (9 April to 3 June) ranges from 4.9 to 10.0 mm.week<sup>-1</sup> and can be utilised for raising a fodder crop within

the short period. From 23rd week to 42nd week (4 June to 21 October) there was well distributed rainfall which could be utilised for raising a main crop. There was a decline in rainfall from 43rd week to 50th week (22 October to 16 December) and suitable for growing less water-required-crops. From 51st to 14th week of succeeding year (17 December to 8 April) there was a dry spell with intermittent rainfall in middle of February.

### Cropping System

The cropping system adopted locally in Ganjam is to raise a pigeonpea or groundnut or finger millet followed by horsegram commencing from June. Based on the rainfall distribution pattern, the following cropping system has been suggested for better utilisation of rainfall.

The rainfall received between middle of April to first week of June was not utilised for raising a crop. During this period, cowpea could be grown for fodder purposes and even it fails, it can be ploughed 'in situ' as a green manure crop. After receipt of rain during second week of June pigeonpea or groundnut can be grown. The crop will be in the field upto middle of October during which finger-millet (var. Dibyasingha) as intercrop would be grown from third week of June to first week of September. After harvest of pigeonpea, the land will be ploughed and sesamum will be sown in lines intercropped with green gram. Both main crop and intercrop will receive

the rainfall from North East Monsoon. The crops will come to harvest by the end of December. The land will be kept fallow from last week of December to middle of April due to continued dry spell. The horsegram may be grown for green manuring purpose in this dry spell if there is an intermittent rainfall during second week of February. By adopting this cropping system, the farmer can get five to six crops (4 main crops—cowpea, pigeonpea, sesamum, horsegram, and two intercrops—finger millet and greengram) instead of existing two main crops (pigeonpea or groundnut and horsegram) with minimum risk.

#### REFERENCES

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Table 4. Mean weekly rainfall and rainy days in Ganjam, Orissa (19974--1988)

Std. Week	Month	Date	Rainfall (mm)	Rainy days
1.	January	1-7	0.0	0.0
2.		8-4	2.2	0.1
3.		15-21	1.4	0.1
4.		22-28	0.0	0.0
5.	February	29-4	1.1	0.1
6.		5-11	6.1	0.2
7.		12-18	9.0	0.5
8.		19-25	1.6	0.2
9.	March	26-4	1.2	0.1
10.		5-11	4.4	0.3
11.		12-18	7.4	0.4
12.		19-25	10.3	0.5
13.	April	26-1	3.8	0.3
14.		2-8	2.7	0.4
15.		9-15	7.2	0.3
16.		16-22	6.8	0.7
17.	May	23-29	7.0	0.5
18.		30-6	4.9	0.6
19.		7-13	5.8	0.6
20.		14-20	10.0	0.5
21.	June	21-27	9.7	0.7
22.		28-3	7.7	0.7
23.		4-10	13.6	0.7
24.		11-17	31.0	1.3
25.	July	18-24	52.9	2.7
26.		25-1	37.7	2.3
27.		2-8	28.4	1.6
28.		9-15	42.0	2.5
29.	August	16-22	53.3	2.8
30.		23-29	35.7	2.3
31.		30-5	44.7	2.7
32.		6-12	48.7	2.3
33.	September	13-19	38.7	2.0
34.		20-26	50.7	2.5
35.		27-2	39.7	2.5
36.		3-9	46.0	2.7
37.	October	10-16	39.9	2.7
38.		17-23	68.8	2.2
39.		24-30	43.9	2.1
40.		1-7	43.9	3.4
41.	November	8-14	20.3	1.5
42.		15-21	51.5	1.9
43.		22-28	13.2	0.7
44.		29-4	28.5	0.9
45.	December	5-11	10.2	0.8
46.		12-18	15.7	0.5
47.		19-25	5.2	0.7
48.		26-2	5.3	0.5
49.		3-9	0.4	0.1
50.		10-16	1.5	0.1
51.		17-13	0.0	0.0
52.		24-31	0.0	0.0