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RAINFALL ANALYSIS AND SUGGESTED CROPPING SYSTEM FOR VRIDDHACHALAM TALUK OF SOUTH ARCOT DISTRICT

P.KALAISELVAN, V.K.RAVICHANDRAN and T.N.BALASUBRAMANIAN
Krishi Vigyan Kendra
Tamil Nadu Agricultural University
Vridhachalam 606 001

ABSTRCT

The rainfall data for the years (1973-1988) pertaining to Vriddhachalam Taluk of South Arcot District were analysed for annual, seasonal, monthly and weekly periods and results are presented in this paper. The existing cropping system are discussed. Based on the rainfall pattern, a modified cropping system is suggested for effective utilisation of land moisture and nutrients and to raise the income of dry land farmers.

KEY WORDS : Rainfall Analysis, Cropping System.

Rainfall is the primary source of soil moisture and this decides crop production particularly under semi-arid tropics. Many workers have reported suitable cropping pattern based on rainfall analysis of that particular area (Kulandaivelu *et al.*, (1980), Balasubramanian *et al.*, (1984) and Panchanathan *et al.*, (1987). Such type of rainfall analysis was not done so far in respect of Vriddhachalam taluk of South Arcot District which is a groundnut tract. Hence, to suggest a suitable improved cropping pattern to Vriddhachalam taluk, study on rainfall analysis was taken up.

This taluk is positioned at 11°30'. North latitude and 79°26' East longitude with an mean elevation of 42.67M. The climate of this place is semi-arid tropics with a mean rainfall of 1057mm. The maximum temperature ranges from 27°c to 42°c (maximum during April). The minimum temperature fluctuates between 19°c and 24.5°c (lowest during December and January). This taluk has got a total cultivable area of 18434 ha against its geographical area of 30029ha.

MATERIALS AND METHODS

Data on recorded rainfall for 16 years from 1973 to 1988 were collected from the Regional Research Station, Vriddhachalam. The data was analysed as suggested by Kulandaivelu *et al.*, (1980). The 75 per cent probability rainfall was also worked out for annual, seasonal and monthly rainfall data.

RESULT S AND DISCUSSION

Annual Rainfall

The mean annual rainfall of Vriddhachalam works to 1057mm received in 67 rainy days (Table 1). The maximum rainfall of 1446 mm was recorded during 1977 while the minimum 506 mm of rainfall was obtained during 1980. The annual coefficient of variation of 20 per cent indicates the

Table 1. Annual rainfall(cm) - Vriddhachalam (1973-1988)

Year	R.F.	R.D.	Year	R.F.	R.D.
1973	1001.4	81	1981	1282.9	79
1974	736.0	63	1982	561.9	48
1975	1139.0	75	1983	1218.9	73
1976	850.6	68	1984	1129.8	74
1977	1446.6	80	1985	1315.0	62
1978	1186.3	80	1986	1206.3	84
1979	1382.2	72	1987	1189.6	59
1980	506.5	46	1988	813.8	36

Annual mean rainfall : 1057.30 mm.
Rainy days (R.D.) : 67
Coefficient of Variation : 20.0%
75% probable rainfall : 850.6 mm

assured receipt of rainfall in every year in this taluk. At 75 per cent probable rainfall, it worked to 851mm.

Seasonal rainfall

The data on the distribution of rainfall for the four standard seasons indicate that contribution from North East Monsoon to the total rainfall was 46.38 per cent (490.47mm), followed by South West monsoon (43.86 per cent) (463.83mm). Summer season had contributed only 6.23 per cent (65.89mm) and the rest was by winter season (3.53 per cent). Considering the CV for the four seasons, South West monsoon stood first in respect of assured rainfall followed by North East monsoon and summer shower (Fig.1). The contribution by winter was uncertain as compared to South West monsoon. There is every possibility of receiving assured rainfall at this tract during summer, South West monsoon and North East monsoon. This summer rains could be effectively used for summer ploughing under rainfed condition. The South West Monsoon and North East Monsoon rains should be used for raising dry crops.

Monthly rainfall

Among different months, November (239.8mm) and September (192.5mm) seem to receive the maximum rainfall followed by October (144.6mm) and August (126.3mm) (Fig.2). The period from June to December could be considered as the best period for growing dry crops, because of the receipt of higher amount of rainfall accounting more than 50mm per month. This could be substantiated from the data on CV and 75 per cent probable rainfall for these months.

Weekly rainfall

The weekly rainfall is more than 10mm per week during the standard week 1,20,22,23,25,26,27,28,33,50 and 52. The rainfall is more than 20mm per week during

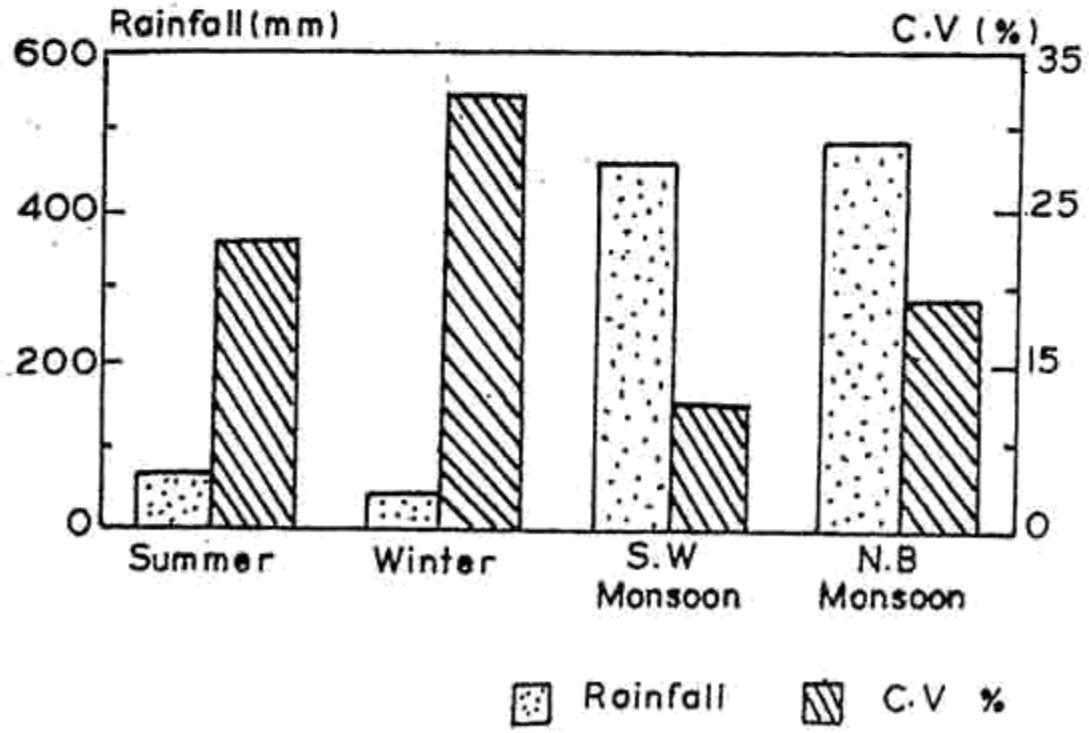

Fig.1. Seasonal rainfall (mm) Vridhachalam (1973-78)

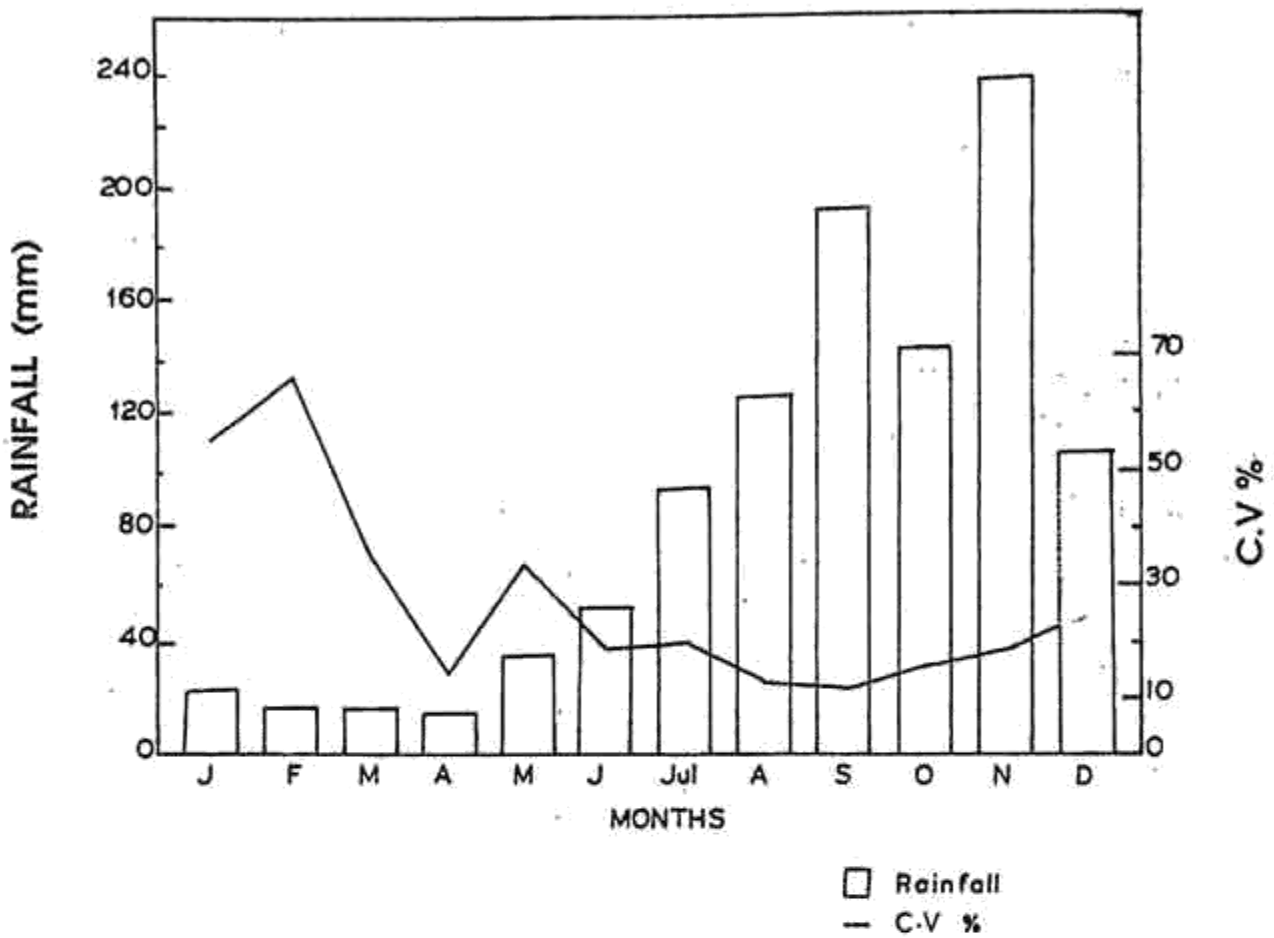

Fig.2. Seasonal monthly mean rainfall and C.V. % Vridhachalam (1973-'88)

29,30,32,34-36,38,42,47-49 and 51. The rainfall is more than 50mm per week during 37,43-46th Standard weeks. Highest rainfall of 84.69 was recorded by 45th week (5-11 of November) (Table 2).

An attempt was made to improve the cropping pattern based on the above rainfall analysis for this taluk.

The important existing cropping pattern followed in this Taluk are as follows.

Rainfed (Double cropping)

1. Groundnut + Cumbu - Pulses/Gingelly.

   (June - July) - (September - October)
   (100-150 Days) (80-85 Days)

2. Cumbu - Pulses/Gingelly

   (June - July) - (September - October)
   (95 days) (80-85 days)

3. Groundnut + Pulses - Gingelly/ Pulses/ Ragi/ Groundnut

   (June - July) - (September - October)
   (100-105 days) (80-85 days)

Groundnut (TMV.7) and *cumbu* (Local) are the major crop varieties sown both under pure and mixed stand on receipt of rains during June-July. Farmers go in for sowing of sorghum (Co.19) or *varagu* (Local) if the South West Monsoon is delayed extremely. In the normal years, they raise pulses or gingelly or *ragi* next to groundnut as a second crop.

Proposed cropping system

Based on the analysis of rainfall, length of growing season, existing cropping pattern, suitable modification is given to the existing cropping system. The suggested cropping system for early,

Table 2. Weekly rainfall (mm) - Vriddhachalam (1973-1988)

Std Week	Month	Date	R.F.	R.D.	C.V.%
1	January	1-7	10.01	0.38	138.24
2		8-14	0.29	0.19	23.26
3		15-21	1.76	0.19	57.17
4		21-28	0.47	0.19	37.41
5	February	29-4	0.49	0.13	0
6		5-11	0.94	0.25	110.65
7		12-18	7.05	0.56	113.37
8		19-25	2.00	0.31	116.67
9	March	26-4	3.48	0.25	21.95
10		5-11	6.58	0.38	18.82
11		12-18	1.55	0.06	0
12		19-25	0.99	0.06	0
13	April	26-1	-	-	0
14		2-8	0.08	0.06	0
15		9-15	1.64	0.06	0
16		16-22	5.03	0.31	50.98
17		23-29	6.52	0.25	58.91
18	May	30-6	7.91	0.63	54.32
19		7-13	9.07	0.50	89.03
20		14-20	11.32	0.63	29.38
21		21-27	2.42	0.44	29.65
22	June	28-3	16.41	0.69	46.67
23		4-10	16.84	1.38	35.45
24		11-17	6.61	0.88	27.04
25		18-24	11.41	1.00	45.20
26	July	25-1	11.18	0.75	44.93
27		2-8	10.63	1.25	24.48
28		9-15	13.75	1.25	67.36
29		16-22	25.64	1.81	31.81
30		23-29	35.55	2.06	27.24
31	August	30-5	9.57	1.31	15.47
32		6-12	28.23	2.19	16.76
33		13-19	15.44	1.38	19.11
34		20-26	38.69	2.56	24.96
35	September	27-2	38.25	2.19	25.30
36		3-9	34.66	2.44	24.69
37		10-16	56.93	2.56	18.73
38		17-23	39.22	2.31	26.07
39		24-30	42.38	2.13	31.66
40	Ocober	1-7	25.41	2.75	26.33
41		8-14	24.83	1.69	46.10
42		15-21	29.52	2.00	28.59
43		22-28	50.71	3.00	23.25
44	November	29-4	61.57	3.31	25.66
45		5-11	84.69	3.75	24.77
46		12-18	53.08	1.75	43.31
47		19-25	23.23	1.75	42.32
48	December	26-2	31.00	2.56	19.47
49		3-9	26.40	1.50	40.46
50		10-16	19.39	1.69	25.76
51		17-23	24.86	1.31	32.85
52		24-31	17.06	1.56	37.86

R.F. : Rainfall R.D. : Raindays

normal and late onset of South West Monsoon rains is as follows:

Early rains

Cumbu (Co.6) - Ragi (Co.7) + Black gram (T9)
(June) (Sep-Oct.)
(95 days) (105-110 days)
- Gingelly (TMV.6)
(December-January)
(80-85 days)

Groundnut (TMV 10)- Gingelly (TMV 3) /
(June - September) Black gram (Co 5) or (KM2)
(100-125 days) (October-November)
(80-85 days)

Normal rains

Gingelly (TMV 3) - Blackgram (T9) / KM2
(June - July) (September - October)
(80-85 days) (65-70 days)

Groundnut (VRI-1/VRI-2) + Red gram (Co 5)
- Ragi (Co 7) + Black gram (T_9)
(June-July) (October - November)
(100-105 days) (105-110 days)

Gingelly (TMV 6)
(December - January)
(80-85 days)

Late rains

Varagu (CO 3) - Gingelly (TMV 3) / Black gram)
(July - August) (October - November)
(100-120 days) (80 - 85 days)

Cumbu (Co 6) - Gingelly (TMV 6)
(September - October) (December - January)
(95 days) (80-85 days)

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ARTIFICIAL INTELLIGENCE BASED EXPERT SYSTEMS: APPLICATIONS TO HORTICULTURE.

P. DURAISAMY

College of Agricultural Engineering
Post Box No.24
Raichur 584 101

ABSTRACT

Decreasing supporting resources and increasing complexity of horticultural crop production necessitate the new technologies be developed to transfer information to farmers as well as commercial producers. Expert systems, a sub area of artificial intelligence of computer science offer the possibility to implement horticultural knowledge into field practice in the form of computer programme in order to support the farmers in decision making at farm level. This paper provides an overview of the concept of expert system and examples of areas of horticultural applications of these systems are in use at present are also outlined. This paper further examines how expert system techniques are being used at present in problem solving and why someone in the field of horticulture might want to use them.

KEY WORDS : Artificial Intelligence, Expert System, Horticulture, Applications.

Increasing complexity of horticultural crop production necessitates the new technologies be developed to transfer information to farmer, extension agents as well as to commercial producers. Besides many horticultural tasks involve complex interaction as well as experience and judgement in making a decision. For instance, horticultural variables namely orchard size, cultivar composition, fruit growth rate and labour costs etc., often require human judgement and expertise of the field of horticulture. This information is also useful where some quick decisions are needed to be taken during preliminary investigation stage.

The modern area of computer science namely Export System (ES), a sub area of Artificial Intelligence (AI) provide an opportunity to develop such a hybrid system so as to help farmers and extension service personnels for making decision in day to day management of horticultural crops. In recent years ES has been recognized as a new type of software technology for use in many research areas of farm science (in agriculture for diagnosing crop diseases, in animal husbandry, reproductive problems in cattle and in agricultural engineering, irrigation system management etc.). They are just beginning to emerge as an area of research and development within horticulture. Before going into the details of practical aspects of bringing ESs in the field of horticulture. An overview of the concept of ES technique is briefly described in this paper.

BASIC CONCEPT OF AN EXPERT SYSTEM

The ES employs human knowledge to solve a problem that ordinarily requires human intelligence. The name comes from the idea that the computer system is programmed to simulate an expert in communication with a client who has a problem to be solved. The knowledge necessary to perform at such a level, plus inference procedure used can be thought of as a model of the expertise of the best practitioners of the field. ES is also called knowledge based system since it relies upon the reservoir of knowledge of a particular domain.

An ES consists of (Fig.1):

(i) A knowledge base of domain facts, rules, procedures and heuristics (rules of thumb,