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RAINFALL AND CROPPING PATTERNS

Volume VII

JAMMU & KASHMIR

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RAINFALL AND CROPPING PATTERNS—STATE SERIES

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RAINFALL AND CROPPING PATTERNS

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INTRODUCTION

1.1 The human population of the country is estimated to rise from the 1971 Census figure of 548 million to 935 million in 2000 AD. This rise calls for increased production. Land resources being limited emphasis has to be placed on increasing productivity per unit area. Temperature and other climatic conditions being favourable for crop production throughout the year over most parts of the country, it is possible to grow more than one crop in a year provided water, the most important input, is available. In some parts of the country the rainy season is long enough to provide scope for double cropping. This potential is yet to be fully exploited. There is scope for increasing irrigation resources in the country, but our estimates show that the area under irrigation is not expected to be more than 42 per cent of the total cropped area even in 2000 AD as against 22 per cent in 1970-71. Therefore, judicious utilisation of direct rainfall and irrigation water, singly and in combination, will have to be thought of for increasing production.

1.2 Farming technology has so advanced that it is possible to increase crop yields even under rainfed conditions, but the choice of crops would have to depend upon the amount and distribution of the prevailing rainfall. Additionally, it will be necessary that the maximum possible quantity of rain water is conserved in ponds and pools situated either within the farm area or elsewhere, in soil profiles and underground storages so that the same could be readily used to save crops in times of water stress. Not only in rainfed farming but even under irrigated conditions, one will have to plan for the most economic and efficient use of water so as to derive maximum possible benefit from rainfall and reduce dependence on irrigation. This necessitates a close study of the existing cropping patterns vis-a-vis rainfall patterns aimed at determining the nature of changes needed in the former. The cropping patterns depend primarily on the soil and climatic factors but the evolution of a cropping pattern in course of time is the combined effect of soil, climate, food habits and requirements and economic factors. In the context of increasing production, it is necessary to examine the cropping patterns from a scientific angle and find out possible alternative patterns having higher potential. Accordingly, the Commission undertook a comprehensive study of the rainfall and cropping patterns of the country using taluk or tehsil as unit of area. It covered several other relevant factors such as orography, land use data, human and livestock populations, soil and climate, the object being to make, as far as possible, an integrated assessment.

1.3 Chapter 14 on Rainfall and Cropping Patterns of the Commission's Report presents a consolidated account of the data collected together with analysis of their inter-relationships on all-India basis. In this analysis the Commission has been greatly benefited by the discussions with the concerned officers of State Governments. It was realised that by condensing the vast amount of information collected from each State into the small space of a chapter, many important and peculiar features of individual States were likely to be missed and hence the data and analysis of each State have been presented in separate volumes. The manner of presentation is similar to Chapter 14. It has also been considered desirable to include in each State volume the methodology and suggestions for future cropping patterns, which are practically the same as given in Chapter 14.

2 METHODOLOGY

2.1 The chief features of the study are (a) use of taluk or tehsil as unit of area for all basic data and analysis; (b) introduction of coded numerical forms to express patterns of distribution of monthly rainfall throughout the year, crops and livestock; (c) inclusion of information on orography, temperature, evapotranspiration, rainfall, soil, irrigation, land use, human and livestock populations and yield performance of crops, all of which influence in different ways and degrees the cropping patterns of a place and (d) presentation of coded information on rainfall, crops and livestock on 1 : 1 million scale maps.

Rainfall Patterns

2.2 A major feature of Indian rainfall is that the southwest monsoon season (June to September) accounts for 70 to 95 per cent of the annual rainfall throughout the country except in the south east peninsula and Kashmir and adjoining hill areas. The monsoon as well as the annual rainfall show large fluctuations from year to year but, as stated in Chapter 13 on Climate and Agriculture, there is no significant evidence of any trend of periodicity in either of them. Considered in relation to crop production,

the total annual or seasonal rainfall does not have much significance and what is important is its distribution during the period of growth of different crops. A relevant question, therefore, is whether rainfall should be examined on a weekly, fortnightly or monthly basis. The coefficient of variation (CV) of monthly rainfall is as high as 40-50 per cent even in the rainiest month of July over most of the central, northern and eastern India. In the south excluding the west coast, CV is higer and varies from 60 to 100 per cent. The variability of weekly or fortnightly rainfall being still greater, makes the use of either of them undependable as indicators of rainfall distribution. For a macro-study like the present, monthly rainfall data which are more dependable and also the most convenient to handle have been used.

2.3 In order to relate crop production with rainfall, certain norms have to be assumed depending on the duration of the crops and their water requirements. On the basis of available information and the fact that most crops mature in about 90 days, the following broad norms have been drawn up :

(i) Rainfall greater than 30 cm per month (cm pm) for at least three consecutive months would be suitable for a crop like paddy whose water need is very high.

(ii) 20-30 cm pm for not less than three consecutive months would be suitable for crops whose water need is high but less than that of paddy, for example, maize and black gram.

(iii) **10-20 cm pm for at least three consecutive months would be suitable for crops requiring much less water, e.g., bajra and small millets.**

(iv) 5-10 cm pm for three consecutive months would be just sufficient for crops which have low water requirements, e.g., *moth* (*P. aconitifolius*) and ephemeral grasses.

(v) Rainfall less than 5 cm pm for three consecutive months is not of much significance for crop production.

2.4 For denoting the year's rainfall distribution using monthly totals, a convenient code in letter symbols with numerical subscripts explained below, has been evolved. The letters A to E in Table 1 indicate the ranges of monthly rainfall and the subscripts to these refer to the number of months having these ranges of rainfall e.g. A_2 indicates two months with rainfall greater than 30 cm pm. The ranges correspond to those stated in the preceding paragraph.

The southwest monsoon months of June to September being the principal rainy season dominate the rainfall distributions of the country. To indicate the season's importance, monthly rainfall distribution during June to September is shown in brackets in the annual pattern. To the right of the bracket is the distribution for the post-monsoon months, namely, October to January and to the left that for the pre-monsoon months namely, February to May. In order to explain how such a coded rainfall distribution written in symbols with numerical subscripts has to be interpreted, a hypothetical example may be considered. $D_1 E_3 (A_2 B_1 C_1) C_1 D_3$, in which for each of the three periods, the symbols are in order of decreasing rainfall which is not necessarily the calendar sequence, can be explained as under :

(i) $D_1 E_3$ represents the period February to May in which one month's rainfall (usually May) is in the range of 5-10 cm and the remaining three months get less than 5 cm pm.

(ii) $A_2 B_1 C_1$ represents the period June to September, in which two months (usually July and August) get more than 30 cm pm rainfall, one month (September) gets 20-30 cm and the remaining month, i.e. June gets 10-20 cm.

(iii) $C_1 D_3$ represents the period October to January in which October gets 10-20 cm rainfall and the rest 5-10 cm pm.

Boundaries of Rainfall Zones

2.5 Since differences in monthly, seasonal and annual rainfall are not large within short distances, linear interpolation of rainfall data is permissible. Rainfall data being point measurements, isolines for the same or nearly the same type of distribution of monthly rainfall can, therefore, be drawn. These isolines may not necessarily follow the boundaries of taluks which are taken to be unit of area in this study

and hence for delineation of boundaries the following procedure has been adopted :

(i) Where variations are small, isolines follow the taluk boundaries;

(ii) where variations are large, isolines delineate the zone boundaries; and

(iii) any taluk, more than three quarters of which lies outside of a zone is not considered a part of that zone.

2.6 If an identical distribution is observed over two or more adjacent taluks a pattern is said to have evolved and the area covered by it is distinguished as a zone and indicated suitably by a Roman numeral. Rainfall patterns have been identified for the whole country using the methodology described above. The data used for the analysis are the monthly normals of rainfall (1901 to 1950)[1] and the patterns and zones are depicted on all-India map which forms part of Chapter 14 on Rainfall and Cropping Patterns of the Commission's Report.

Cropping Patterns

2.7 The basic data for the study of cropping patterns of the country are the areas under different crops in each of the taluks. A large number of crops are grown in a taluk but most of them occupy small areas, often less than one per cent of the total cropped areas of the taluk. With a view to limiting the number of crops constituting a pattern only those crops are considered which individually occupy 10 per cent or more of the gross cropped area of the taluk. In this process, several crops have to be excluded, even though they may be otherwise important. The minimum limit has been fixed at 70 per cent, so that the number of crops, which together cover at least 70 per cent of the gross cropped area, and in which none occupies less than 10 per cent, is not large. Trial computations have shown that in such distributions any crop occupying more than 10 per cent area is rarely omitted and the number of crops hardly exceeds five. When the same distribution holds good for two or more adjacent taluks, a pattern is obtained.

2.8 As in the case of rainfall, percentage area coverage by crops is expressed by means of numerical subscripts affixed to crop symbols shown in Table 2. The list of crops given below is comprehensive and will hold good for all the States.

TABLE 2
Crop Symbols and Area Intervals

Crop	Symbol
1 rice	pd
2 wheat	w
3 jowar (kharif)	Jk
4 jowar (rabi)	Jr
5 bajra	B
6 maize	M
7 ragi	R
8 small millets	Mt
9 barley	Ba

TABLE 2 (*Contd.*)

Crop	Symbol
10 oats	Oa
11 gram	G
12 pigeonpea(tur)	T
13 pulses other than pigeonpea and gram	Pu
14 groundnut	Gn
15 oilseeds other than grondnut	O
16 cotton	C
17 jute	Ju
18 other fibres	Fb
19 sugarcane	S
20 potato	Pt
21 vegetables	V
22 fruits	Fr
23 tapioca	Ta
24 plantations	L
25 fodder	F
26 chillies	Ch
27 tobacco	To

Area interval (per cent)	Subscript
70 or more	1
50—70	2
30—50	3
10—30	4
less than 10	5

The crop code contains the crop symbol and the appropriate subscript. In writing crop distribution, the first crop has always the highest area but the rest may not necessarily follow the order of decreasing areas. For example, crop distribution, $C_3 J_{14} M_4$ means that cotton area is 30-50 per cent and jowar rabi and millets each occupies 10.30 per cent of the gross cropped area, the total being 70 per cent or more. Two or more taluks having the same distribution constitute a pattern. Cropping patterns so derived have been indicated on maps of 1 : 1 million size.

Relative Yield Index of Crops

2.9 Besides the absolute figures the yield of a crop has also been expressed as per cent of all-India average which is called Relative Yield Index (RYI), Relative Yield Index values have been computed for the principal crops on the basis of (1968-69 to 1970-71) data available in the records of the Directorate of Economics and Statistics, Ministry of Agriculture and Irrigation.

Livestock Patterns

2.10 The livestock patterns are relevant only insofar as these are related to production of fodder and feeds. As talukwise data were not available for the livestock Census, 1972, those of 1966 Census as published by the States have been used. The animals considered for livestock analysis are shown in Table 3 together with their symbols.

1 Memoirs of India Metorological Department, Volume XXXI, Part 3 1962.

The livestock patterns are expressed in coded form in the same manner as the cropping patterns.

Soils

2.11 Soil data on a taluk basis are not available for all the areas of the country. As such, soils have been discussed in a general manner using the traditional nomenclature in describing their characteristics.

Other Data

2.12 The sources of other data featuring in the study are given below :

item	source
taluk area .	States' Census Reports 1971 or from the data furnished by the States in their land-use returns.
orography	maps of the Survey of India and National Atlas Organisation.
temperature	Climatological Tables of Observatories in India, India Meteorological Department, 1931—1960 normals
evapotranspiration	scientific Report No. 136 of the India Meteorological Department, 1971.
human population	Census of India, 1971
irrigation and land use statistics .	basic data pertaining to land utilisations statistics obtained from the States and refer mostly to 1969-70

Presentation of Information

2.13 The tables required for following the text are given in the text itself at appropriate places, whereas the basic data are appended as follows :

APPENDIX 1	Talukwise Land Use (1969-70) and Population Statistics, (arranged according to State rainfall zones).
APPENDIX 2	Talukwise Livestock Population—1966 (arranged according to State rainfall zones).
APPENDIX 3	Zonewise Information on Rainfall, Rainy days and Cropping Patterns.
APPENDIX 4	Zonewise Area under Principal Crops.

2.14 Rainfall, cropping and livestock patterns of each State are indicated on maps in the 1 : 1 million scale and given in Appendices 5, 6 and 7 respectively. In the case of rainfall patterns, the zonal numbers in State maps have been given in Roman numerals and their all-India equivalents as used in Chapter 14 of the Commission's Report have been shown in three digit Arabic numerals within brackets.

3 GENERAL FEATURES

3.1 The geographical area of Jammu & Kashmir State according to 1971 Census is 222, 236 sq. km. This includes areas under illegal occupation of China and Pakistan. The State consists of ten districts and fortyfour tehsils. Jammu region consists of Doda, Udhampur, Jammu, Kathua, Rajouri and Punch districts and Kashmir region includes Anantnag, Ladakh, Baramulla and Srinagar districts. The total reporting area of the State according to the village papers is 45,230 sq. km. This excludes areas under illegal occupation of China and Pakistan as also certain non-reporting areas in the State.

Elevation

3.2 The elevations in the southern tehsils of Jammu and Kathua districts are 300 to 500 masl (metres above sea level). In Reasi and Rajauri districts, the elevations range from 600-800 masl, while in the northern districts they are mostly of the order of 1600 masl rising in places to 3000 masl. In Leh, the elevation is 3500 masl.

Population

3.3 The total population of the State is 46.2 million with an average population density of 34 per sq. km. The population density varies very considerably from 1 in Ladakh to 275 in Srinagar district. Population density in various districts of the State is given in Table 4.

TABLE 4

Dnosity of Population (per sq km)

District	Density
Anantnag	155
Srinagar	275
Baramula	104
Ladakh	1
Doda	29
Udampur	74
Jammu	231
Kathua	104
Rajauri	81
Punch	103

Land use

3.4 Forests occupy substantial areas in the State being 2,778,000 ha. Proportion of area under forests to total reporting area is high, in Udhampur, Doda and Rajauri districts, being 40 to 50 per cent, whereas it is quite low in Kashmir region. However, it does not represent the true picture of Kashmir region since information regarding a considerable proportion of total geographical area is not available. Land not available for cultivation is 20 to 30 per cent in the districts of Jammu region except in Doda where it is 16 per cent only. In Kashmir region it is 17 to 19 per cent except for Leh where it is 50 per cent. Fallow lands are less than 5 per cent except for 14 per cent (average) in Jammu district. The net sown area in the southern districts of Doda, Udhampur, Rajauri and Punch is 10-20 per cent and Jammu nearly 30 per cent though in Ranbir Singh Tehsil it is as high as 70 per cent. In the northern districts of Kashmir region it is around 60 per cent. In Handwara, Sopore and Baramula tehsils net sown area is as high as 75 per cent of the reported area. In Leh it is only 23 per cent. Table 5 shows the land use pattern in different districts based on village papers. Area sown more than once varies from less than 10 per cent of the net sown area in half the number of tehsils to over 80 per cent in two tehsils of Jammu. Of the 8 tehsils with cropping intensity of over 150 per cent, four are in Jammu district which has an average of 162 per cent.

TABLE 5

Land Use Statistics—1969-70

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District	Forests	Not available for cultivation	Cultivable waste	Permanent pastures & other grazing lands	Land under misc. tree crops & groves	Fallow lands	Net area sown	Area sown more than once as per cent of net sown area.
Srinagar	1·6	19·1	5·3	7·7	2·1	1·6	62·7	3·2
Anantnag	0·5	17·7	6·7	8·6	1·7	5·0	59·7	14·7
Baramula	0·8	17·0	7·2	8·9	0·7	4·5	61·0	1·6
Ladakh	0·1	50·5	15·3	1·6	2·0	1·2	29·3	6·3
Jammu	14·7	26·0	12·6	3·5	0·9	14·3	28·0	82·8
Kathua	26·3	29·5	3·8	4·2	8·7	3·5	23·8	37·4
Doda	53·2	16·0	4·7	1·9	8·9	2·5	12·8	13·5
Udhampur	45·3	22·3	5·4	4·7	7·0	2·2	13·1	43·0
Rajauri	41·3	24·3	5·7	6·9	0·5	2·7	16·6	50·0
Punch	27·6	24·9	6·2	14·4	3·2	3·4	20·8	24·7

NOTE : The percentage figures have been rounded off individually and hence cross totals may not in some cases, add up to 100.

Soils

3.5 Red and yellow soils cover the southern half of Kathua, northern half of Jammu and southern half of Reasi while southern half of Jammu has recent alluvial soils. Mostly sub-montane soils prevail in the rest of the State except in Ladakh, which has mountain and meadow soils.

3.6 The net irrigated area in 1967-68 was 279,00 ha, 97 per cent of which was irrigated by canals There is wide variation in net irrigated area in districts being 68 per cent of net sown area in Srinagar and only 10-13 per cent in Udhampur, Rajauri and Punch. Twelve tehsils in the northern districts of Srinagar, Anantnag and Baramula and one tehsil of Ranbirsinghpora in Jammu have more than 50 per cent area under irrigation. Net area irrigated in southern tehsils is generally less than 20 per cent.

Rainfall

3.7 Rainfall data for the northern areas and Ladakh are scanty. Therefore, the observations relating to these areas are only indicative and approximate. The average annual rainfall in the State varies considerably from less than 10 cm in Leh (Ladakh district) and its neighbourhood to about 200 cm in Gulabgarh (Udhampur district). The belt from Basohli in Kathua district to Punch district has annual average rainfall of 150 to 200 cm. The district annual average rainfall excepting Srinagar and Ladakh exceeds 100 cm. In southern areas the month of maximum rainfall is August, while in the north and Ladakh maximum rainfall occurs in March. In southern areas rainfall in July and August is of the same order and total for both the months is 50-60 per cent of the annual precipitation. June to September period receives 65 to 75 per cent of annual rainfall. In northern areas, January to April period gets about 50 per cent of annual rainfall. In Doda district, the months January to April receive heaviest rainfall. Rainfall in July and August is slightly less but of the same order. Districtwise monthly and annual rainfall and monthly rainfall as per cent of annual are given in Table 6.

TABLE 6

Districtwise Monthly and Annual Rainfall

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rainfall (mm)

District	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec.	Annual
1. Anantnag	136·3	139·3	156·2	128·0	83·0	48·7	76·2	78·8	62·9	35·1	24·4	76·3	1045·2
	(13·0)	(13·3)	(14·9)	(12·2)	(7·9)	(4·7)	(7·3)	(7·5)	(6·0)	(3·4)	(2·3)	(7·3)	
2. Srinagar	61·0	71·6	80·7	83·9	64·4	30·5	57·6	68·5	41·0	25·1	11·7	33·1	629·1
	(9·7)	(11·4)	(12·8)	(13·3)	(10·2)	(4·8)	(9·2)	(10·9)	(6·5)	(4·0)	(1·9)	(5·3)	
3. Baramula	127·3	130·2	168·9	133·1	85·2	56·9	65·6	67·1	47·1	46·8	23·3	69·0	1020·5
	(12·4)	(12·8)	(16·6)	(13·0)	(8·3)	(5·6)	(6·4)	(6·6)	(4·6)	(4·6)	(2·3)	(6·8)	
4. Ladakh	43·4	42·8	60·6	43·6	26·7	8·5	10·6	13·0	11·2	7·9	5·7	23·4	297·4
	(14·6)	(14·4)	(20·4)	(14·7)	(9·0)	(2·9)	(3·6)	(4·4)	(3·8)	(2·7)	(1·9)	(7·9)	
5. Doda	147·6	144·8	149·0	97·2	58·5	48·7	118·9	110·9	62·9	32·6	21·3	82·1	1074·5
	(13·7)	(13·5)	(13·9)	(9·0)	(5·4)	(4·5)	(11·1)	(10·3)	(5·9)	(3·0)	(2·0)	(7·6)	
6. Udhampur	129·5	122·4	106·3	63·1	40·0	92·8	419·3	452·8	161·3	25·6	13·6	61·5	1688·2
	(7·7)	(7·3)	(6·3)	(3·7)	(2·4)	(5·5)	(24·8)	(26·8)	(9·6)	(1·5)	(0·8)	(3·6)	
7. Jammu	63·0	56·2	54·9	28·4	22·0	57·5	300·3	307·3	115·3	12·9	6·4	31·6	1055·8
	(6·0)	(5·3)	(5·2)	(2·7)	(2·1)	(5·4)	(28·4)	(29·1)	(10·9)	(1·2)	(0·6)	(3·0)	
8. Kathua	78·2	71·0	63·6	30·1	20·9	62·8	374·3	390·3	136·1	18·2	6·3	39·7	1291·8
	(6·1)	(5·5)	(4·9)	(2·3)	(1·6)	(4·9)	(29·0)	(30·2)	(10·5)	(1·4)	(0·5)	(3·1)	
9. Rajauri	85·0	87·4	85·0	56·3	39·6	81·8	291·9	290·0	115·9	22·9	11·2	42·8	1209·8
	(7·0)	(7·2)	(7·0)	(4·7)	(3·3)	(6·8)	(24·1)	(24·0)	(9·6)	(1·9)	(0·9)	(3·5)	
10. Punch	127·0	127·8	138·9	93·7	67·6	99·6	300·5	290·8	116·8	32·3	16·8	62·2	1474·0
	(8·6)	(8·7)	(9·4)	(6·4)	(4·6)	(6·8)	(20·4)	(19·7)	(7·9)	(2·2)	(1·1)	(4·2)	

NOTE : Figures in paranthies denote the percentages of monthly rainfall to annual rainfall.

In southern areas, the months of heaviest rainfall are July and August each receiving 30 to 40 cm pm followed by September with 10 to 16 cm pm and June with 5 to 10 cm pm only. In northern areas, June to September months receive 5 to 10 cm pm rainfall. Rainfall in January to April period is generally between 10 and 15 cm pm excepting Srinagar and Ladakh where it is 5 to 10 cm pm and 4 to 6 cm pm respectively.

Variability

3.8 Coefficient of Variation (CV) for the months of January to May is of the order of 60 per cent in Srinagar and adjoining areas rising to 100 per cent close to the southern boundary. CV in June is 80 to 100 per cent. In the rainiest months of July and August in the south CV is 40 to 50 per cent. CV in the northern areas is much higher being 80 to 100 per cent or more. CV in the months of October to December is very high being more than 100 per cent. Seasonal CV for January—February combined is 50 to 60 per cent and for March to May 40 to 60 per

cent. The lower values of CV are in Srinagar area. CV in the months of June to September in south is 30 to 40 per cent and 40 to 50 per cent or higher in the northern areas. October to December CV is 80 to 100 per cent. CV of annual rainfall is only 20 to 25 per cent over most of the areas to the south and west of Srinagar. CV in Srinagar is 30 per cent and in Leh area 40 per cent. Coefficients of variation for the State as a whole are as follows :

Coefficient of Variation (CV%)

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct
57	59	50	48	53	56	33	82	82	100

Nov	Dec	Annual	June-Sept.	Jan-Feb.	March-May
139	75	16	26	38	28

Temperature

3.9 The normals of monthly maximum, minimum and mean daily temperatures are given in Tables 7 to 9.

TABLE 7

Normals of Daily Maximum Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Dras	—9·0	—6·7	—2·0	5·4	15·1	20·5	23·7	23·6	19·6	12·8	4·3	—4·0	8·6
Kargil	—4·2	—1·6	4·7	14·0	21·6	25·7	29·7	28·9	24·9	18·5	10·4	1·2	14·5
Leh	—2·0	0·8	6·4	12·4	17·1	21·1	24·7	24·2	20·9	14·2	7·8	1·6	12·4
Srinagar	4·4	7·9	13·4	19·3	24·6	29·0	30·8	29·9	28·3	22·6	15·5	8·8	19·5
Gulmarg						20·0	21·4	20·3	18·2				
Jammu	18·4	21·1	26·4	33·1	39·0	40·4	35·4	33·2	33·3	31·4	26·2	21·1	29·9

TABLE 8

Normals of Daily Minimum Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Dras	—22·2	—21·4	—15·0	—5·2	1·5	5·6	10·6	10·5	5·9	—1·1	—8·6	—16·9	—4·6
Kargil	—13·3	—12·1	—5·3	3·4	9·4	13·4	17·7	17·2	12·5	5·4	—1·3	—7·9	3·3
Leh	—14·0	—11·8	—6·3	—1·2	2·8	6·7	10·2	9·6	5·4	—0·9	—6·6	—11·1	—1·3
Srinagar	—2·3	—0·8	3·5	7·4	11·2	14·4	18·4	17·9	12·7	5·7	—0·1	—1·8	7·2
Gulmarg						6·9	10·5	10·2	5·5				
Jammu	8·3	10·6	14·8	20·5	25·8	27·7	26·0	25·1	23·9	19·4	13·4	9·3	18·7

TABLE 9

Normals of Daily Mean Temperature (°C)

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept.	Oct.	Nov	Dec	Annual
Dras	—15·5	—14·0	—8·4	0·1	8·3	13·1	17·2	17·1	12·8	5·9	—2·1	—10·4	2·0
Kargil	—8·7	—6·9	—0·3	8·7	15·5	19·5	23·7	23·1	18·7	11·9	4·5	—3·3	8·9
Leh	—8·3	—5·4	0·1	5·6	10·0	13·9	17·5	16·9	13·2	6·7	0·6	—4·7	5·5
Srinagar	1·1	3·6	8·5	13·4	17·9	21·7	24·6	23·9	20·5	14·2	7·7	3·5	13·4
Gulmarg						13·5	15·9	15·3	11·9				
Jammu	13·4	15·9	20·6	26·8	32·4	34·1	30·7	29·3	28·6	25·4	19·8	15·2	24·4

The hottest month is June in southern districts and July in northern ones with an average temperature of 40°C. Temperature in May and August is 1° either way of this value the difference being due to variation elevation. The maximum temperature in Srinagar is 30—31°C. The minimum temperature averages in the southern areas 8 to 11°C while in the northern areas, winter is very severe with temperatures much below the freezing point. Temperature in January and February are is low as—22°C in Dras, —14°C in Leh and —2°C in Srinagar. In the south, the hottest month is June having a temperature of 34°C. Temperatures in the months of July to September average 29 to 31°C. In north, July is the hottest month followed by August which has a slightly lower temperature of one degree. Due to differences in elevations, the temperatures in these months range between 15 to 25°C. Average of mean daily tempera-ture in Srinagar is 24—25°C. During winter months of December to February, mean daily temperatures are 13 to 16°C in south and 10 to 15°C below zero in Dras. Average daily mean temperature in Srinagar in January is 1°C.

Potential Evapotranspiration (PE)

3.10 Monthly and annual values of PE for three northern stations Dras, Leh and Srinagar are given in Table 10. The annual PE ranges between 75 to 90 cm. PE in December and January is only 1-2 cm and 10 to 14 cm in the months May to August. In the southern areas, PE is much higher and similar to adjoining Punjab. The annual PE is about 140 cm. PE in June is 20 cm and 17 cm in July. In December and January PE is 3 to 4 cm.

TABLE 10

Normal Monthly and Annual Potential Evapotrenspiration (PE)

(mm)

Station	Jan	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Annual
Dras	9·2	13·7	32·4	55·7	97·4	125·3	138·0	128·2	93·8	51·6	19·4	9·6	775·0
Leh	16·1	25·4	50·3	78·7	105·7	119·2	123·0	106·4	81·1	82·1	27·4	17·5	803·4
Srinagar	18·4	28·0	53·8	80·7	111·2	130·9	135·8	117·6	95·0	57·8	26·5	17·7	874·0

4 RAINFALL ZONES, THEIR CROPPING PATTERNS AND LIVESTOCK PATTERNS

4.1 The State is divided into 12 Rainfall Zones. These are indicated below together with the number of taluks included in each and their total approximate areas.

Rainfall Zone	Rainfall Pattern	Number of taluks with their total area in sq. km
I	E_4 (E_4) E_4	3(572)
II	D_1 E_3 (B_2 C_1 E_1) D_1 E_3	1(402)
III	D_2 E_2 (B_2 E_2) D_1 E_3 .	1(1127)
IV	D_2 E_2 (A_2 C_1 E_1) D_1 E_3	7(5525)
V	D_4 (D_2 E_2) D_1 E_3	10(2931)
VI	C_1 D_1 E_2 (A_2 C_1 E_1) C_3 D_1 E_2	3(3256)
VII	C_2 D_1 E_1 (A_2 C_1 E_1) C_1 D_1 E_2	3(2484)
VIII	C_2 D_2 (C_2 D_2) C_1 D_1 E_2	3(2470)
IX	C_2 D_2 (B_2 C_1 E_1) C_1 D_1 E_2	2(1143)
X	C_3 D_1 (D_1 E_3) C_1 D_1 E_2	5(1370)
XI	C_3 D_1 (D_3 E_1) C_1 D_1 E_2	2(2158)
XII	C_3 D_1 (D_4) C_1 D_1 E_2	4(750)

Rainfall Zone I—E_4 (E_4) E_4

4.2 The district, taluk and cropping patterns included in the zone are :

Cropping pattern	Taluk	District
Mt_3 W_4 (W_4 Pu_4)	Leh	Ladakh
	Zanskar	,,
	Kargil	,,

4.3 The area of the zone is 572 sq km and comprises of 3 taluks. The population density of the zone is 184 per sq km.

4.4 The gross cropped area is 18,000 ha, out of which 17,000 ha is net sown area. The net irrigated area is 16,000 ha. The area under small millets is 50 per cent of the cropped area followed by wheat (18 per cent).

4.5 Goats constitute 44 per cent of total livestock population followed by sheep (32 per cent). The two livestock patterns of the zone are :

S_3 G_4

G_3 S_4

Rainfall Zone II—D_1 E_3 (B_2 C_1 E_1) D_1 E_3

4.6 The taluk included in the zone is Ranbirsingh-pora and the cropping pattern is Pd_3 W_3.

4.7 The area of the zone is 402 sq km and comprises only one taluk. It has a population density of 389 per sq km.

4.8 The gross cropped area is 54,000 ha, and paddy occupies 46 per cent of the cropped area followed by wheat 42 per cent.

4.9 The relative yield index value of rice in Jammu district is 85 per cent of all-India level.

4.10 Youngstock (cattle) constitute 24 per cent of livestock population, followed by female cattle (21 per cent), female buffaloes (19 per cent) and male cattle (12 per cent). The livestock pattern is Cy_4 Cf_4 Bf_4 Cm_4.

Rainfall Zone III—D_2 E_2 (B_2 E_2) D_1 E_3

4.11 The taluk included in this zone is Newshera in Rajauri district and the cropping pattern is W_3 M_3.

4.12 The area of the zone is 1127 sq km and comprises only one taluk. The population density is 65 per sq km.

4.13 The sown area is 14,000 ha and the gross cropped area is 23,000 ha. The net irrigated area is 1,000 ha. Wheat occupies 48 per cent of cropped area, followed by Maize covering 40 per cent.

4.14 Livestock population comprises of goats (20 per cent), female cattle (18 per cent) and male cattle (17 per cent). The livestock pattern is G_4 Cf_4 Cm_4 Cy_4/Bf_4.

Rainfall Zone IV—D_2 E_2 (A_2 C_1 E_1) D_1 E_3

4.15 The districts, taluks and the cropping patterns in the zone are :

Cropping pattern	Taluk	District
$W_3 M_4$ Pd_4/B_4	Akhnoor	Jammu
	Jammu	,,
	Samba	,,
	Kathua	Kathua
	Hiranagar	,,
Pd_3 M_4 W_4/O_4/V_4	Billawar	,,
$M_3 W_4 Ba_4$/Pu_4/Mt_4/Pd_4	Bashohili	,,

4.16 The area of the zone is 5,525 sq km comprising of 7 taluks in 2 districts. The average population density is 154 per sq km.

4.17 The gross cropped area is 201,000 ha and about 22,000 ha is under irrigation. Wheat occupies 39 per cent of the gross cropped area, followed by paddy (17 per cent) and maize (14 per cent).

4.18 Goats constitute 23 per cent of the livestock population followed by youngstock (cattle) (17 per cent), female cattle (16 per cent) and male cattle (15 per cent). The livestock patterns of the zone are :

G_4 S_4 Cf_4 Cy_4

G_4 Clf_4 Cm_4 Bf_4

Rainfall Zone V—D$_4$ (D$_2$ E$_2$) D$_1$ E$_3$

4.19 The districts, taluks and the cropping patterns in the zone are :

Cropping pattern	Taluk	District
Pd$_2$ M$_4$.	Anantnag	Anantnag
	Pulwama	,,
	Shupiyan	,,
	Tral	,,
	Pahalgam	,,
Pd$_3$ M$_4$ W$_4$/O$_4$/V$_4$	Srinagar	Srinagar
	Beerwah	,,
	Gandarbal	,,
	Chadura	,,
	Badgam	,,

4.20 The area of the zone is 2,931 sq km and comprises of 10 taluks in two districts. The average population density is 497 per sq km.

4.21 The gross cropped area of the zone is 1,97,000 ha. Paddy occupies 45 per cent of the cropped area, followed by maize (22 per cent) and oilseeds other than groundnut (11 per cent).

4.22 Sheep constitute 45 per cent of the total livestock, followed by female cattle (19 per cent), youngstock (cattle) (16 per cent) and male cattle (14 per cent). The livestock pattern is S$_3$ Cf$_4$ Cm$_4$/Cy$_4$.

Rainfall Zone VI—C$_1$ D$_1$ E$_2$ (A$_2$ C$_1$ E$_1$) C$_1$ D$_1$ E$_2$

4.23 The district, taluks and the cropping patterns in the zone are :

Cropping pattern	Taluk	District
M$_3$ W$_3$	Reasi	Udhampur
	Udhampur	,,
M$_3$ W$_4$ Ba$_4$/Pu$_4$/Mt$_4$/Pd$_4$	Ramnagar	,,

4.24 The area of the zone is 3,256 sq km and comprises of 3 taluks. The average population density is 82 per sq km.

4.25 The gross cropped area is 70,000 ha, out of which maize occupies 41 per cent, wheat 31 per cent and paddy 13 per cent.

4.26 Goats account for 23 per cent of total livestock population, followed by sheep (18 per cent) and male cattle (14 per cent). The livestock pattern is G$_4$ S$_4$ Cm$_4$.

Rainfall Zone VII—C$_2$ D$_1$ E$_1$ (A$_2$ C$_1$ E$_1$) C$_1$ D$_1$ E$_2$

4.27 The districts, taluks and the cropping patterns in the zone are :

Cropping pattern	Taluk	District
M$_1$	Goal Gulab Garh	Udhampu
	Budhal	Rajauri
M$_2$ W$_4$.	Rajauri	,,

4.28 The area of the zone is 2484 sq km with an average population density of 88 per sq km.

4.29 The gross cropped area is 51,000 ha and net area sown is 40,000 ha. Maize occupies 64 per cent of the gross cropped area followed by wheat (22 per cent) and paddy (12 per cent).

4.30 Sheep constitute 25 per cent of the livestock population, with goats, female and youngstock cattle accounting for another 45 per cent. The livestock patterns are :

(i) S$_4$ G$_4$ Cf$_4$ Cy$_4$

(ii) G$_4$ Cf$_4$ Cm$_4$ Cy$_4$ Bf$_4$

Rainfall Zone VIII—C$_2$ D$_2$ (C$_2$ D$_1$) C$_1$ D$_1$ E$_2$

4.31 The district, taluks and the cropping patterns in the zone are :

Cropping pattern	Taluk	District
M$_1$	Ramban	Doda
	Doda	,,
M$_3$ W$_4$ Ba$_4$/Pu$_4$/Mt$_4$/Pd$_4$	Bhadarwah	,,

4.32 The area of the zone is 2470 sq km and has an average population density of 99 per sq km.

4.33 As against a net sown area of 37,000 ha, the gross cropped area is 41,000 ha. An area of 4,000 ha is under irrigation. Maize occupies 61 per cent of the cropped area.

4.34 Sheep account for 30 per cent of the livestock population, followed by female cattle (19 per cent), male cattle (17 per cent) and youngstock cattle (14 per cent). The livestock patterns are :

(i) S$_4$ G$_4$ Cf$_4$ Cy$_4$

(ii) S$_4$ Cf$_4$ Cm$_4$ Cy$_4$

Rainfall Zone IX—C$_2$ D$_2$ (B$_2$ C$_1$ E$_1$) C$_1$ D$_1$ E$_2$

4.35 The district, taluks and the cropping pattern are as follows :

Cropping pattern	Taluk	District
M$_1$	Haveli	Punch
	Mendhar	,,

4.36 The area of the zone is 1,143 sq km and the average population density is 149 per sq km.

4.37 The gross cropped area is 29,000 ha and the net shown area is 24,000 ha. Maize is the principal crop occupying 69 per cent of the cropped area and wheat occupies 17 per cent of cropped area.

4.38 Female buffaloes constitute 21 per cent of livestock population, followed by male cattle (18 per cent), sheep (17 per cent) and female cattle (14 per cent). The livestock pattern is :

Bf$_7$ S$_4$ G$_4$ Cm$_4$/Cm$_1$ Cy$_1$

Rainfall Zone X—C$_3$ D$_1$ (D$_1$ E$_3$) C$_1$ D$_1$ E$_2$

4.39 The district, taluks and the cropping patterns in the zone are :

Cropping pattern	Taluk	District
Pd$_3$ M$_3$	Bandipore	Baramulla
	Handwara	,,
Pd$_3$ M$_4$ Pu$_4$/W$_4$	Baramulla	,,
	Sonawari	,,
	Sopore	,,

4.40 The total area of the zone is 1,370 sq km has an average population density of 384 per sq km.

4.41 The gross cropped area is 95,000 ha, and nearly 43,000 ha is under irrigation. Paddy, Maize and Pulses are the main crops of the zone, occuping 39, 24 and 11 per cent of cropped area respectively.

4.42 Sheep constitute 46 per cent of the total livestock population with female, male and youngstock cattle constituting 17, 16 and 15 per cent respectively. The livestock pattern is :

S$_5$ Cf$_4$ Cm$_1$/Cy$_1$

Rainfall Zone XI—C$_3$ D$_1$ D$_3$ (E$_1$ C$_1$ D$_1$ E$_2$)

4.43 The districts, taluks and the cropping patterns are :

Cropping pattern	Taluk	District
Pd$_2$ M$_4$	Kishtwa	Doda
M$_3$ W$_4$ Ba$_4$/Pu$_4$/Mt$_4$/Pd$_4$	Kulgam	Anantnag

4.44 The area of the zone is 2,158 sq km and has an average population density of 139 per sq km.

4.45 The gross cropped area is 50,000 ha out of which nearly 24,000 ha is under irrigation. Paddy and maize are the principal crops cultivated occupying 40 and 32 per cent of cropped area respectively.

4.46 Sheep are the principal class of livestock, accounting for 44 per cent of the livestock population. The livestock patterns is S$_3$ Cf$_4$ Cm$_4$/Cy$_1$.

Rainfall Zone XII—C$_3$ D$_1$ (D$_4$) C$_1$ D$_1$ E$_2$

4.47 The district, taluks and the cropping patterns in the zone are :

Cropping pattern	Taluk	District
M$_1$	Karnah	Baramulla
	Uri	,,
Pd$_3$ M$_3$	Kupwara	,,
	Gulmarg	,,

4.48 The area of the zone is 750 sq km and has a population density of 332 per sq km.

4.49 The gross cropped area is 37,000 ha, out of which 21,000 ha is irrigated. Maize and paddy are the principal crops occupying 46 and 42 per cent of cropped area respectively.

4.50 Sheep constitute 36 per cent of livestock population, followed by female, youngstock and male cattle with 20, 14 and 13 per cent respectively.

Relative Yield Index

4.51 Since RYI values are not available separately for each zone the yield values of important crops are discussed briefly below :

(a) The RYI of maize for the three year period 1965-68 of the State is 91 per cent of all-India level, though the yield in Punch is higher than all-India and lower in Srinagar.

(b) The yields of rice are well above all-India level in the northern districts, but less elsewhere.

(c) The yield of pulses is high in the northern districts being in the range of 150 to 220 per cent of all-India level.

5 FUTURE CROPPING PATTERNS—SOME OBSERVATIONS

General

5.1 In the foregoing sections we have dealt with in detail the rainfall, cropping and livestock patterns which emerge from the existing information. We have also categorised the rainfall patterns into zones and discussed how the other patterns feature in those zones. Among other information that on soils, which ought to play an important role in determining cropping patterns, is lacking in such details as are wanted for this analysis. Data on orography and population density have featured in this analysis but their exact role on cropping and livestock patterns could not be brought out owing to lack of detailed information. We are, however, convinced that studies and analysis indicated in the preceding sections are important for the guidance they may give in deciding cropping and livestock patterns vis-a-vis rainfall patterns. The greater the accuracy of the primary information, and the more detailed such information is, the more useful the data would be in drawing up the most efficient cropping and livestock patterns in an area or a zone. With this purpose in view the following procedures are suggested :—

    (i) Delineation of rainfall zones;

    (ii) Identification of the existing cropping patterns;

    (iii) Assessment of area needed for each crop and its ideal distribution.

    (iv) Comparison of (iii) with (ii) in order to determine possible changes; and

    (v) Consideration of other related factors like soil, irrigation facilities, density of population, livestock patterns and then arriving at the future cropping patterns.

5.2 The methods of delineating rainfall patterns or zones and cropping patterns have been fully discussed in Section 2. For the purpose of locating suitable areas for a crop, soil and topography of the land are important factors. The approximate area to be put under each crop will be decided by the demand for it not only at a State level but at the national level, either for internal consumption or for the purpose of export. The departments responsible for crop planning of a State should, therefore, be cognisant of the demand for a crop, so that production efforts are not rendered futile because of lack of demand and marketing. We have already discussed the part each of the factors mentioned in item (v) or para 5.1 is likely to play in deciding cropping patterns. For this purpose not only detailed data but also knowledge about the correlation between these factors and crop performance would be necessary. Knowledge gained, through long experience, by farmers would also be most helpful.

5.3 We ought to mention that the rainfall intervals which form the basis of identifying rainfall patterns

are subject to minor modifications. Thus, the condition that 30 cm of rainfall for three consecutive months is good for paddy may not be rigorously adhered to. If the soil is favourable with a high water retention capacity or, what is more important, water management is efficient with an eye to economise water use, rainfall lower than 30 cm for three months may sustain a good crop of paddy.

5.4 The choice of a cropping pattern is not decided by the farmer only on technical grounds. He is also guided by the profitability of the crops or requirements for his household consumption. Farmers may not be inclined to accept a crop unless the necessary inputs and infrastructure are assured. Of all the inputs water is the most important as is made evident by the spread of groundnut in the country, sugarcane in Gujarat, maize and cotton in Karnataka and recently of wheat in West Bengal. These are excellent instances of the manner of introduction of new crops in the cropping patterns of a State or a region.

Some Observations Pertaining to Jammu & Kashmir

5.5 The district of Punch, Rajauri, Udhampur, Jammu and kathua experience rainfall of A or B type in the months of July and August. The main crops in these districts are maize and wheat and in low lying situation paddy is also taken here and there. In the districts of Kashmir valley, the main slant is for the production of fruit crops, which require temperate climate. The State has also specialised in the production of vegetable and flower seeds of temperate origin.

5.6 Crop production programmes in the State should be confined to the southern districts and valley areas. Emphasis should increasingly shift towards tapping forest wealth and horticultural development programmes. Just as Kerala is specialising in plantation crops, this State should tend to specialise in fruit crops and forest produce. Such a process would be facilitated if a steady supply of foodgrains could be maintained at reasonable cost. Among fruit crops, special attention might be devoted to the development of exportable varieties of walnuts.

5.7 In the higher elevations of the northern parts, crop production activity is undertaken in the months of March to June after the snow melts. This is the period when irrigation is a problem over the plains. Therefore, the advantage which this State has in the months of March to June could be utilised for bettering the economy of the State by growing off-season vegetable crops wherever it is possible to do so with the snow-melt. The vegetables thus produced could be supplied to other parts of the country. Production of forage materials could be increased considerably in hilly regions which will facilitate development of animal industry specially of sheep and cattle.

APPENDIX I

Talukwise Land Use (1969-70) and Population Statis ic
JAMMU AND KASHMIR

Area : '000 hecters

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc &g	Fallow lands	Net area sown
	total	per sq km							
Ladakh	*Rainfall Zone—I*		..		..	..	*Rainfall Pattern—$E_4(E_4)E_4$*		
Leh	51,891	134	— (—)	23 (60)	4 (11)	1 (2)	1 (2)	1 (2)	9 (23)
Zanskar	6,886	172	— (—)	1 (23)	1 (33)	neg (0·4)	neg (1)	neg (1)	2 (42)
Kargil	46,514	319	neg. (0·4)	5 (32)	3 (22)	— (—)	0·2 (1)	neg (0·4)	6 (44)
Jammu	*Rainfall Zone—II*		..	..	..	*Rainfall Pattern—$D_1E_3(B_2 C_1 E_1)$*		D_1E_3	
Ranbir Singhpora	156,395	389	— (—)	0·4 (1)	5 (13)	— (—)	— (—)	7 (18)	28 (68)
Rajgauri	*Rainfall Zone—III*		..	..	..	*Rainfall Pattern—$D_2E_2(B_2E_2)D_1E_3$*			
Navshera	72,893	65	51 (45)	24 (21)	13 (12)	5 (5)	0·4 (0·4)	5 (4)	14 (12)
Jammu	*Rainfall Zone—IV*		..	..	..	*Rainfall Pattern—$D_2E_2(A_2C_1E_1)$*		D_1E_3	
Akhnoor	122,462	112	28 (26)	23 (21)	13 (12)	5 (4)	0·4 (0·4)	22 (20)	17 (16)
Jammu	338,219	356	10 (10)	30 (32)	10 (11)	6 (7)	2 (2)	6 (6)	31 (32)
Samba	114,667	137	11 (13)	32 (38)	12 (14)	0·3 (0·4)	1 (1)	12 (14)	16 (20)
Kathua									
Billawar	58,071	86	19 (29)	20 (30)	1 (2)	5 (8)	6 (9)	1 (2)	13 (20)
Bashohli	48,699	56	36 (42)	26 (30)	2 (2)	3 (4)	7 (9)	1 (1)	10) (12)
Kathua	[82,254	147	8 (15)	18 (32)	2 (4)	1 (2)	7 (13)	2 (3)	19 (33)
Hiranagar	83,647	156	6 (10)	14 (26)	5 (9)	2 (3)	2 (4)	5 (9)	21 (39
Anantnag	*Rainfall Zone—V*		..	..	..	*Rainfall Pattern—D_4 (D_2E_2)*		D_1E_3	
Anantnag	274,473	477	(0·1) (0·2)	10 (18)	4 (6)	4 (8)	2 (3)	2 (4)	35 (61)
Pulwama	155,426	234	0·4 (1)	11 (16)	4 (6)	6 (10)	1 (1)	5 (7)	40 (59)
Shupiyan	98,318	316	0·3 (1)	6 (19)	2 (6)	3 (10)	0·3 (1)	1 (3)	19 (60)
Tral	60,414	na	na						
Pahalgam	40,692	377	neg (0·3)	3 (25)	1 (10)	1 (9)	0·1 (1)	0·3 (2)	6 (53)

— = nil or negligible.
n.a. = data not available.
Nac = not available for cultivation
CW = culturable waste
PP & gl = permanent pastures & other grazing lands
Mtc & g = miscellaneous tree crops & groves not included in the net area sown.

NOTE : Figures in brackets represent percentages to total reporting area.

District/taluk	Population 1971		Forests	Nac	Cw	Pp&gl	Mtc&g	Fallow lands	Net area sown
	total	per sq km							
	Rainfall Zone—V (concld.), ..			..	..	*Rainfall Pattern—D_4 (D_2E_2) D_1E_3*			
Srinagar									
Srinagar	463,879	2035	1 (3)	7 (31)	2 (8)	1 (4)	1 (5)	0.1 (1)	11 (48)
Beerwah	78,196	357	0.2 (1)	3 (15)	1 (3)	2 (10)	0.1 (1)	0.3 (1)	15 (69)
Ganderbal	94,785	356	1 (2)	6 (23)	2 (7)	2 (7)	1 (3)	1 (3)	15 (55)
Chadura	98,042	353	0.4 (1)	3 (11)	1 (2)	2 (8)	0.4 (2)	1 (3)	20 (72)
Badgam	92,795	330	0.2 (1)	3 (16)	1 (5)	3 (9)	0.2 (1)	neg (0.1)	19 (69)
	Rainfall Zone—VI		..	..	..	*Rainfall Pattern—$C_1D_1E_2$ ($A_2C_1E_1$)$C_1D_1E_2$*			
Udhampur									
Reasi	53,275	65	37 (45)	16 (20)	3 (4)	2 (3)	12 (14)	3 (4)	8 (10)
Udhampur	121,485	112	32 (29)	35 (33)	9 (8)	5 (5)	6 (6)	2 (2)	19 (17)
Ramnagar	90,715	67	70 (51)	27 (20)	10 (7)	6 (5)	1 (1)	4 (3)	18 (13)
	Rainfall Zone—VII		..	..	..	*Rainfall Pattern—$C_2D_1E_1$ ($A_2C_1E_1$) $C_1D_1E_2$*			
Udhampur									
Goal-Gulabgarh	73,371	67	58 (53)	18 (17)	3 (2)	7 (6)	11 (10)	1 (1)	12 (11)
Rajauri									
Rajauri	116,491	114	36 (35)	26 (26)	5 (5)	10 (10)	1 (1)	1 (1)	22 (22)
Budhal	27,989	75	17 (44)	11 (29)	1 (3)	2 (6)	— (—)	1 (2)	— (1)
	Rainfall Zone—VIII		..	..	*Rainfall Pattern—C_2 D_2 (C_2 D_2) C_1 D^1 E_2*				
Doda									
Doda	74,139	73	56 (55)	12 (12)	4 (3)	2 (2)	14 (14)	2 (2)	12 (12)
Ramban	88,783	79	63 (56)	21 (18)	4 (3)	4 (4)	7 (6)	2 (2)	12 (11)
Bhaderwah	81,455	249	1 (2)	13 (39)	1 (2)	0.3 (1)	1 (2)	5 (15)	13 (38)
	Rainfall Zone—IX		..	..	*Rainfall Pattern—C_2 D_2 (B_2 C_1 E_1) C_1 D_1 E_2*				
Punch									
Haveli	74,699	159	9 (18)	13 (27)	6 (12)	7 (16)	2 (4)	1 (2)	10 (21)
Mendhar	96,088	144	23 (34)	15 (22)	2 (2)	9 (14)	1 (2)	3 (5)	14 (21)

APPENDIX 1(*concld.*)

District /taluk	Population 1971		Forests	Nac	Cw	Pp &gl	M/c &g	Fallow lands	Net area sown
	total	per sq km							
	Rainfall Zone —X		..	..	..	*Rainfall Pattern—C_3 D_1 (D_1 E_3) C_1 D_1 E_2*			
Baramula									
Baramula	134,007	399	neg (0·1)	3 (10)	1 (4)	3 (8)	0·1 (0·4)	2 (5)	24 (73)
Sonawari	97,244	324	0·3 (1)	5 (17)	2 (5)	2 (7)	0·2 (1)	3 (11)	17 (58)
Bandipore	71,593	447	neg. (0·2)	3 (17)	3 (17)	1 (7)	0·1 (1)	1 (14)	8 (51)
Sapore	127,823	433	neg (0·3)	4 (14)	0·4 (2)	2 (6)	0·4 (1)	1 (2)	22 (75)
Handwara	96,009	344	0·3 (1)	3 (11)	1 (2)	2 (8)	0·1 (1)	1 (2)	21 (75)
	Rainfall Zone —XI		..	..	..	*Rainfall Pattern—C_3 D_1 (D_3E_1)C_1 D_1 E_2*			
Doda									
Kishtwar	97,843	60	99 (60)	20 (12)	9 (7)	2 (1)	14 (9)	1 (1)	16 (10)
Anantnag									
Kulgam	202957	394	0. 3 (1)	9 (17)	4 (8)	4 (8)	1 (1)	3 (6)	31 (59)
	Rainfall Zone- -XII		..	..	..	*Rainfall Pattern—C_3 D_1 (D_4) C_1 D_1 E_2*			
Baramula									
Karnah	22,066	272	0·1 (1)	3 (41)	0·2 (3)	1 (11)	neg. (0·4)	1 (11)	3 (32)
Kupwara	139,749	457	neg. (0·1)	4 (13)	3 (8)	3 (9)	0·2 (1)	0·4 (2)	21 (67)
Gulmarg	37,022	343	neg. (0·4)	2 (20)	0·4 (4)	1 (7)	neg. (0·1)	0·4 (4)	7 (64)
Uri	50,211	197	1 (3)	8 (32)	5 (19)	5 (18)	0·3 (1)	1 (2)	6 (24)

APPENDIX 2

Talukwise Livestock Population—1966

JAMMU AND KASHMIR

(Thousands)

District/ Taluk	Cattle			Buffaloes			Sheep	Goats	Horses & ponies	Mules	Donkeys	Camels	Pigs	Total livestock
	Male	Female	Young stock	Male	Female	Young stock								
Ladakh	*Rainfall Zone—I*		..		..				..		.. *Rainfall Pattern—E4 (E4) E4*			
Leh	1 (1)	10 (6)	6 (3)	13* (8)			48 (27)	86 (49)	5 (3)	1 (·1)	6 (3)	— (—)	— (—)	176·8
Zanskar	— (—)	1 (4)	— (—)	3* (16)			8 (45)	5 (29)	1 (4)	— (—)	0.2 (1)	— (—)	— (—)	17·0
Kargil	1 (1)	6 (11)	2 (5)	1 (2)			22 (45)	15 (30)	2 (4)	— (—)	1 (1)	— (—)	— (—)	49.2
Jammu	*Rainfall Zone—II* ..			..		..		..	*Rainfall Pattern—D1 E3 (B2 C1 E1) D1 E3*					
Ranbir Singh pora	11 (12)	19 (21)	22 (24)	6 (6)	17 (19)	10 (11)	2 (2)	2 (2)	2 (2)	0·1 (0·1)	0·3 (0·4)	0·1 0·1	0·2 (0·2)	91·5
Rajauri	*Rainfall Zone—III*		..			..		..	*Rainfall Pattern—D2 E2 (B2 E2) D1 E3*					
Nowshehra	16 (17)	17 (18)	15 (16)	0·2 (0·3)	12 (13)	7 (7)	7 (7)	18 (20)	1 (1)	0·2 (0·3)	— (—)	— (—)	— (—)	93·0
Jammu	*Rainfall Zone—IV*		..			..		..	*Rainfall Pattern—D2 E2 (A2 C1 E1) D1 E3*					
Akhnoor	23 (26)	11 (12)	10 (12)	2 (2)	11 (12)	8 (8)	3 (3)	21 (23)	1 (1)	0·2 (0·2)	0.2 (0·2)	0·4 (0·5)	— (—)	89·4
Jammu	24 (15)	26 (16)	27 (17)	4 (2)	17 (11)	11 (7)	9 (5)	37 (23)	3 (2)	0·3 (0·2)	0·4 (0·3)	1 (1)	0·1 (0·1)	159·3
Samba	17 (14)	22 (18)	23 (19)	3 (2)	9 (7)	7 (5)	5 (4)	37 (31)	1 (1)	0·1 (0·1)	0·4 (0·3)	1 (0·4)	— (—)	123·5
Kathua														
Billawar	11 (13)	14 (16)	13 (16)	4 (4)	7 (8)	5 (6)	13 (16)	17 (20)	0·4 (0·5)	0·1 (0·2)	— (—)	— (—)	— (—)	83·4
Bashohli	17 (13)	20 (15)	21 (16)	2 (2)	9 (7)	7 (5)	23 (17)	29 (23)	1 (1)	0·2 (0·2)	— (—)	— (—)	— (—)	129·1
Kathua														
Kathua	13 (11)	15 (13)	18 (16)	3 (2)	8 (7)	6 (5)	21 (19)	26 (24)	2 (2)	0·3 (0·3)	1 (1)	0·2 (0·2)	— (—)	111·7
Hira-nagar	12 (13)	18 (20)	22 (23)	4 (5)	6 (6)	6 (6)	8 (9)	14 (15)	2 (2)	0·2 (0·2)	0·4 (0·5)	0·3 (0·3)	— (—)	93·5
Anantnag	*Rainfall Zone—V*		..		..			..	*Rainfall Pattern—D4 (D2 E2) D1 E3*					
Anantnag	27 (14)	38 (20)	32 (17)	— (—)	2 (1)	1 (0·3)	81 (43)	5 (3)	5 (2)	0·2 (0·1)	0·3 (0·2)	— (—)	— (—)	189·8
Pulwama	29 (15)	29 (15)	28 (14)	— (—)	1 (0·4)	0·1 (0·1)	91 (48)	10 (5)	3 (1)	— (—)	0·2 (0·1)	— (—)	— (—)	190·6
Shupiyan	10 (12)	13 (15)	13 (15)	— (—)	1 (1)	0·3 (0·3)	47 (53)	1 (1)	2 (2)	0·1 (0·1)	— (—)	— (—)	— (—)	88·1
Tral							na							
Pahalgam	5 (16)	7 (24)	5 (17)	— (—)	1 (4)	0·3 (1)	10 (32)	1 (3)	1 (4)	— (—)	— (—)	— (—)	— (—)	31·2

*In Leh, Kargil and Zanskar taluks total buffaloes are given.

n.a.=data not available

NOTE : Figures in brackets represent percentages to total livestock.

APPENDIX 2 (*Contd.*)

(Thousands)

District/ Taluk	Cattle			Buffaloes			Sheep	Goats	Horses & ponies	Mules	Donkeys	Camels	Pigs	Total live-stock
	Male	Female	Young stock	Male	Female	Young stock								
			Rainfall Zone—V (Contd.)						*Rainfall Pattern—D_4 ($D_2 E_2$) $D_1 E_3$*					
Srinagar														
Srinagar	5 (10)	18 (34)	11 (21)	— (—)	0·1 (0·1)	— (—)	16 (31)	1 (3)	1 (1)	— (—)	0·1 (0·2)	— (—)	— (—)	52·0
Beerwah	8 (14)	11 (18)	8 (15)	— (—)	0·1 (0·1)	— (—)	27 (46)	2 (4)	2 (3)	— (—)	— (—)	— (—)	— (—)	58·3
Ganderbal	7 (15)	10 (20)	9 (18)	— (—)	1 (1)	0·3 (1)	18 (35)	3 (6)	2 (4)	— (—)	— (—)	— (—)	— (—)	50·3
Chadura	10 (14)	11 (16)	10 (14)	— (—)	0·3 (0·4)	0·1 (0·1)	35 (52)	1 (2)	1 (2)	— (—)	— (—)	— (—)	— (—)	68·4
Badgam	10 (16)	13 (21)	10 (16)	— (—)	0·1 (0·2)	— (—)	28 (44)	1 (1)	1 (2)	— (—)	— (—)	— (—)	— (—)	63·0
			Rainfall Zone—VI						*Rainfall Pattern—$C_1 D_1 E_2$ ($A_2 C_1 E_1$) $C_1 D_1 E_2$*					
Udhampur														
Reasi	15 (12)	12 (10)	14 (12)	1 (1)	11 (9)	8 (7)	20 (17)	34 (29)	2 (2)	1 (1)	— (—)	— (—)	— (—)	117·4
Udham-pur	28 (16)	27 (15)	27 (15)	3 (2)	16 (9)	10 (6)	27 (16)	35 (20)	1 (0·4)	0·2 (0·1)	— (—)	— (—)	— (—)	173·8
Ram-nagar	25 (13)	27 (15)	25 (13)	4 (2)	16 (8)	11 (6)	38 (20)	42 (22)	1 (0·4)	0·2 (0·1)	— (—)	— (—)	— (—)	189·6
			Rainfall Zone—VII						*Rainfall Pattern—$C_2 D_1 E_1$ ($A_2 C_1 E_1$) $C_1 D_1 E_2$*					
Udhampur														
Goal Gulab Garh	14 (11)	17 (14)	15 (12)	0·3 (0·3)	13 (11)	7 (6)	31 (25)	23 (19)	3 (2)	0·3 (0·3)	— (—)	— (—)	— (—)	125·5
Rajauri														
Rajauri						na								
Budhal						na								
			Rainfall Zone—VIII						*Rainfall Pattern—$C_2 D_2$ ($C_2 D_2$) $C_1 D_1 E_2$*					
Doda														
Doda	21 (17)	21 (17)	17 (14)	0·1 (0·1)	3 (3)	1 (1)	41 (33)	16 (13)	1 (1)	— (—)	— (—)	— (—)	— (—)	122·8
Ramban	18 (16)	26 (24)	17 (15)	0·1 (0·1)	6 (6)	2 (2)	26 (24)	13 (12)	1 (1)	— (—)	— (—)	— (—)	— (—)	109·2
Bhader-wah	18 (18)	18 (17)	12 (12)	0·2 (0·2)	4 (4)	2 (2)	35 (34)	13 (12)	1 (1)	0·1 (0·1)	0·1 (0·1)	— (—)	— (—)	103·5
			Rainfall Zone—IX						*Rainfall Pattern—$C_2 D_2$ ($B_2 C_1 E_1$) $C_1 D_1 E_2$*					
Punch														
Haveli	10 (16)	11 (17)	9 (14)	0·1 (0·1)	10 (16)	4 (7)	11 (17)	7 (11)	1 (1)	0·1 (0·1)	— (—)	— (—)	— (—)	63·5
Mendhar	14 (21)	7 (10)	5 (7)	0·2 (0·3)	18 (27)	7 (10)	11 (16)	5 (8)	1 (1)	0·1 (0·2)	— (—)	— (—)	— (—)	67·9

APPENDIX 2 (*Concld.*)   (Thousands)

District/ Taluk	Cattle			Buffaloes			Sheep	Goats	Horses and ponies	Mules	Donkeys	Camels	Pigs	Total live-stock
	Male	Female	Young stock	Male	Female	Young stock								
Rainfall Zone—X			..			..			..		*Rainfall Pattern—C_3D_1 (D_1E_3) $C_1D_1E_2$*			
Baramula														
Baramula	12 (14)	14 (16)	12 (14)	— (—)	0·3 (0·4)	0·1 (0·1)	43 (49)	3 (4)	2 (2)	— (—)	— (—)	— (—)	— (—)	86·6
Sonawari	12 (16)	13 (18)	12 (15)	— (—)	— (—)	— (—)	35 (47)	1 (2)	1 (2)	— (—)	— (—)	— (—)	— (—)	74·9
Bandi-pore	7 (11)	10 (14)	8 (12)	— (—)	1 (2)	0·3 (0·4)	33 (49)	5 (8)	3 (4)	0·2 (0·2)	— (—)	— (—)	— (—)	67·4
Sopore	13 (18)	15 (20)	12 (16)	— (—)	0·1 (0·1)	— (—)	30 (41)	2 (3)	1 (2)	— (—)	— (—)	— (—)	— (—)	72·9
Hand-wara	13 (20)	11 (17)	9 (14)	— (—)	1 (1)	0·3 (0·4)	26 (41)	3 (5)	1 (2)	— (—)	— (—)	— (—)	— (—)	63·3
Rainfall Zone—XI			..			..		..			*Rainfall Pattern—C_3D_1 (D_3E_3) $C_1D_1E_2$*			
Doda														
Kisht-war	15 (10)	19 (13)	15 (10)	0·3 (0·2)	7 (5)	3 (2)	60 (41)	23 (15)	2 (1)	2 (1)	3 (2)	— (—)	— (—)	148·3
Anantnag														
Kulgam	20 (13)	26 (18)	26 (17)	— (—)	1 (1)	0·3 (0·2)	70 (47)	3 (2)	3 (2)	— (—)	0·2 (0·2)	— (—)	— (—)	149·2
Rainfall Zone—XII			..			..			..		*Rainfall Pattern—C_3D_1 (D_4) $C_1D_1E_2$*			
Baramula														
Karnah	2 (11)	5 (19)	4 (16)	— (—)	1 (4)	0·3 (1)	7 (27)	4 (18)	1 (3)	0·1 (1)	— (—)	— (—)	— (—)	23·7
Kupwara	14 (17)	17 (20)	10 (12)	— (—)	1 (1)	0·2 (0·2)	32 (39)	7 (9)	2 (2)	0·1 (0·1)	— (—)	— (—)	— (—)	82·9
Gulmarg	4 (14)	4 (17)	4 (16)	— (—)	0·2 (1)	0·1 (0·2)	11 (44)	1 (5)	1 (2)	— (—)	— (—)	— (—)	— (—)	25·0
Uri	4 (8)	10 (20)	7 (15)	0·1 (0·1)	4 (8)	1 (3)	14 (30)	8 (16)	0·2 (0·4)	— (—)	— (—)	— (—)	— (—)	47·7

APPENDIX 3

Rainfall and Cropping Patterns
JAMMU AND KASHMIR

Cropping patterns	District	Taluk	Area in sq km	Elevation (masl) max	Elevation (masl) min	Annual total rainfall (cm)	Annual number of rainy days	Month of maximum rainfall	Rainfall in two consecutive months including the month of maximum plus the preceding or succeeding month whichever is higher — Cm	no. of rainy days	Consecutive months (a)	(b)	(c)
	Rainfall Zone—I	..	..	..	..	..	..		*Rainfall Pattern—E_4 (E_4 E_4)*				
$Mt_3W_4(W_4Pu_4)$	Ladakh	Leh	386	na.	na	..	..	8	3	3	—	—	—
		Zanskar	40	na	na	9	11	3	3	8	—	—	—
		Kargil	146	na	na	26	24	3	10	na	—	—	—
	Rainfall Zone—II	..	..						*Rainfall Pattern—$D_1E_3(B_2C_1E_1$) D_3E_3*				
Pd_3W_3	Jammu	Ranbirsingh pora	402	na	na	91	38	7	50	17	7—3	61	21
	Rainfall Zone—III								*Rainfall Pattern—D_2E_2 (B_2E_2) D_1E_3*				
W_3M_3	Rajauri	Nowshehra	1127	na	na	98	49	7	49	20	7—3	59	25
	Rainfall Zone—IV	..	..						*Rainfall Pattern—$D_2E_2(A_2C_1E_1$) D_1E_3*				
$W_3M_4Pd_4/B_4$	Jammu	Akhnoor	1092	na	na	111	47	8'	65	23	7—3	78	27
		Jammu	951	na	na	112	52	7	63	23	7—3	75	28
		Samba	836	na	na	108	43	8'	65	21	7—3	76	25
$Pd_3M_4W_4/O_4/V_4$	Kathua	Billawar	673	na	na			na			—	—	—
$M_3W_4Ba_4/Pu_4/Mt_4/Pd_4$		Basholi	862	na	na	157	58	8'	93	28	7—3	107	33
$W_3M_4Pd_4/B_4$		Kathua	575	na	na	118	50	8'	69	24	7—3	83	29
		Hiranagar	536	na	na	113	44	8—7	67	22	7—3	80	26
	Rainfall Zone—V	..	..		..		..		*Rainfall Pattern—$D_4(D_2E_2)$ D_1E_3*				
Pd_2M_4	Anantnag	Anantnag	575	na	na	66	49	4'	17	13	—	—	—
$Pd_3M_4W_4/O_4/V_4$		Pulwama	665	na	na	61	42	3	16	11	—	—	—
Pd_2M_4		Shupiyan	311					ra			—	—	—
$Pd_3M_4W_4/O_4/V_4$		Tral	na					ra			—	—	—
Pd_2M_4		Pahalgam	108					ra			—	—	—
$Pd_3M_4W_4/O_4/V_4$	Srinagar	Srinagar	228	na	ra	66	57	3—4	18	15	—	—	—
Pd_2M_4		Beerwah	219					ra			—	—	—
		Ganderbal	266					ra			—	—	—
$Pd_3M_4W_4/O_4/V_4$		Chadura	278					ra			—	—	—
		Badgam	281					ra			—	—	—

Rainfall and cropping pattern data by rainfall zone — values read in printed column order (see footnotes for column symbols).

Rainfall Zone—VI
Rainfall Pattern—$C_1D_1E_1(A_1C_1E_1)$ $C_2D_2E_2$

Cropping Pattern	District	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
M_3W_3	Udhampur	Reasi	..	818	na	..	165	63	..	8'	94	29	7–3 / 1–2	110 / 21	34 / 10
		Udhampur	..	1081	na	na	150	65	..	8'	79	30	7–3 / 1–2	94 / 21	35 / 10
$M_3W_4Ba_4/Pu_4/Mt_4/Pd_4$		Ramnagar	..	1357	na	na	170	70	..	8'	91	31	6–4 / 1–3	118 / 33	42 / 16

Rainfall Zone—VII
Rainfall Pattern—$C_2D_1E_1(A_2C_2E_2)C_1D_1E_1$

Cropping Pattern	District	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
M_1	Udhampur	Goal-Gulab Garb	..	1091	na	na	190	59	..	8–7	85	23	6–4 / 1–4	111 / 59	32 / 20
M_2W_4	Rajauri	Rajauri	..	1019	na	na	144	66	..	8'	67	27	6–4 / 1–3	91 / 31	38 / 15
M_1		Budhal	..	374	na	na	—	—	na	—	—	na	—		

Rainfall Zone—VIII
Rainfall Pattern—$C_2D_2(\,C_2D_2)\,C_1D_1E_2$

Cropping Pattern	District	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
$M_3W_4Ba_4/Pu_4/Mt_4/Pd_4$	Doda	Doda	..	1020	—	—	—	—	na	—	—	na	—		
M_1		Ramban	..	1123	na	na	121	62	..	1	34	14	7–2 / 1–3	29 / 50	17 / 21
$M_3W_4Ba_4/Pu_4/Mt_4/Pd_4$		Bhaderwah	..	327	na	na	112	65	..	1–2	32	14	1–3 / 7–2	46 / 25	21 / 17

Rainfall Zone—IX
Rainfall Pattern—$C_2D_2(B_2C_1E_1)\,C_1D_1E_2$

Cropping Pattern	District	Station	(1)	(2)	(3)	(4)
M_1	Punch	Haveli	..	474	—	na
		Mendhar		669	—	na

Rainfall Zone—X
Rainfall Pattern—$C_3D_1(D_1E_3)C_1D_1E_2$

Cropping Pattern	District	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
$Pd_3M_4Pu_4/W_4$	Baramula	Baramula	..	336	na	na	96	66	..	3	30	18	1–4	54	33
		Sonawari		300	na	na	—	—	na	—	—	na	—		
		Bandipore		160	na	—	na	—	na	—	—	na	—		
Pd_3M_3		Sopore		295	na	na	78	58	..	3'	25	16	1–3	35	23
$Pd_3M_4Pu_4/W_4$		Handwara		279	na	na	—	—	na	—	—	na	—		
Pd_3M_3															

Rainfall Zone—XI
Rainfall Pattern—$C_3D_1(D_3E_1)C_1D_1E_2$

Cropping Pattern	District	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
$M_3W_4Ba_4/Pu_4/Mt_4/Pd_4$	Doda	Kishtwar	..	1643	na	na	89	58	..	3'	26	14	1–4	47	28
Pd_3M_4	Anantnag	Kulgam		515	na	na	91	56	..	1	23	13	1–4	46	27

Rainfall Zone—XII
Rainfall Pattern—$C_3D_1\,(D_4)C_1D_1E_2$

Cropping Pattern	District	Station	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
M_1	Baramula	Karnah	..	81	na	na	114	71	..	3'	30	16	1–4 / 7–2	56 / 21	31 / 15
Pd_3M_3		Kupwara		306	—	—	—	—	na	—	—	na	—		
		Gulmarg		108											
M_1		Uri		255	na	na	123	76	..	3	33	18	1–5	71	40

*Consecutive months with rainfall of more than 10 cm per month.

a = Initial months with more than 10 cm of rainfall and number of consecutive months with more than 10 cm per month separated by hyphen.

b = Total rainfall of consecutive month under 'a' in cm.

c = Total number of rainy days of consecutive months under 'a'

masi = metres above sea level.

na = data not available.

NOTES : 1. Information on rainfall and rainy days based on Memoirs of India Meteorological Department, Vol. XXXI, Part III.

2. For explanation of coded form of rainfall and cropping patterns, reference may be made to section 2 in the text.

APPENDIX 4
Area under Principal Crops (1969-70)
JAMMU AND KASHMIR

(Thousand hectares)

District/taluk	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	C	L	F	Misc.
Ladakh																				
Rainfall Zone —I																			*Rainfall Pattern—$E_4(E_4)$ E_4*	
Leh	9	—	—	—	—	—	:	2 (22)	1 (9)	4 (28)	—	—	0.4 (5)	—	—	—	—	—	—	1.6 (16)
Zanskar	2	—	—	—	—	—	—	0.2 (11)	—	1 (47)	—	—	0.2 (11)	—	—	—	—	—	—	0.6 (31)
Kargil	7	—	—	—	—	—	—	1 (14)	—	4 (50)	—	—	0.4 (7)	—	—	—	—	—	—	1.6 (22.8)
Jammu																				
Rainfall Zone—II																			*Rainfall Pattern—$D_1 E_3 (B_2 C_1 E_1)$ $D_1 E_5$*	
Ranbir Singhpora	54	25 (46)	—	—	1 (1)	1 (2)	—	22 (42)	0.3 (1)	—	—	—	0.4 (1)	0.2 (0.3)	—	0.1 (1)	0.1 (0.1)	—	—	3.0 (5.6)
Rajauri																				
Rainfall Zone—III																			*Rainfall Pattern—$D_2 E_2 (B_2 E_2) D_1 E_5$*	
Nowshehra	23	1 (4)	—	—	—	9 (40)	:	11 (48)	—	—	—	—	1 (3)	0.1 (0.4)	—	1 (2)	—	—	—	—
Jammu																				
Rainfall Zone—IV																			*Rainfall Pattern—$D_2 E_2 (A_2 C_1 E_1) D_1 E_5$*	
Akhnoor	33	2 (5)	—	—	5 (15)	4 (11)	—	15 (46)	1 (2)	—	1 (2)	—	5 (14)	—	—	—	—	—	—	—
Jammu	52	9 (17)	—	—	2 (4)	7 (14)	—	21 (41)	1 (2)	1 (2)	0.4 (1)	—	2 (3)	0.3 (1)	—	1 (1)	0.2 (0.4)	—	—	7.1 (13.6)
Samba	29	3 (9)	—	—	3 (9)	2 (7)	—	13 (51)	1 (4)	1 (2)	0.4 (1)	—	3 (9)	0.2 (1)	—	1 (2)	0.1 (0.3)	—	—	1.3 (4.5)
Kathua																				
Billawar	19	6 (32)	—	—	—	5 (26)	—	5 (26)	1 (5)	—	—	—	1 (5)	0.1 (1)	—	0.4 (2)	—	—	—	0.5 (2.6)
Bashohli	15	3 (19)	—	—	—	5 (34)	—	4 (26)	1 (7)	0.1 (1)	—	—	1 (5)	—	—	1 (7)	—	—	—	—
Kathua	26	7 (28)	—	—	2 (9)	4 (14)	—	9 (35)	1 (2)	—	—	—	1 (6)	0.1 (1)	—	2 (6)	0.2 (0.4)	—	—	1.6 (6.1)
Hiranagar	27	4 (15)	0.1 (0.2)	—	2 (9)	2 (9)	—	11 (40)	1 (2)	—	0.1 (0.3)	—	2 (8)	0.4 (2)	—	2 (8)	0.3 (1)	—	—	2.1 (7.7)

Rainfall Zone—V

Rainfall Pattern—$D_4(D_2E)_2$ D_1 E_3

Anantnag

District/Tehsil				
Anantnag	40	19 (49)	11 (29)	5 (12)	2 (5)
Pulwama	51	19 (37)	9 (18)	10 (20)	5·0 (9·8)
Shupiyan	19	10 (53)	5 (26)	1 (5)	1·4 (7·4)
Tral					
Pahalgam	6	3 (47)	2 (30)	1 (17)	(—)

Srinagar

Rainfall Zone—VI

Srinagar	11	4 (35)	1 (10)	0·3 (3)	4·7 (42·7)
Beerwah	15	9 (60)	3 (20)	0·4 (3)	0·6 (4·0)
Ganderba	15	8 (55)	4 (28)	0·4 (3)	1·3 (8·6)
Chadura	21	7 (34)	5 (23)	3 (13)	4·6 (21·9)
Badgam	19	10 (53)	4 (21)	1 (7)	2·0 (10·5)

Rainfall Pattern—$a_1D_1E_2(A_2a_1E_1)$ $a_1D_1E_2$

Udhampur

Rainfall Zone—VI

Reasi	14	1 (8)	6 (40)	5 (37)	0·4 (2·8)
Udhampur	28	3 (10)	12 (45)	8 (27)	1 (3)
Ramnagar	28	5 (19)	11 (37)	9 (31)	1 (2)

Rainfall Pattern—$C_2D_1E_1$ $(A_2G_1E_1)$ $C_1D_1E_2$

Udhampur

Rainfall Zone—VII

Gool-Gulab Garh	12	1 (7)	10 (83)	1 (6)	0·3 (2)

Rajauri

Rajauri	33	4 (11)	18 (55)	10 (31)	0·6 (1·8)
Budhal	6	1 (12)	5 (77)		

Pd = paddy
Jk = jowar kharif
Jr = jowar rabi
B = bajra
M = maize
R = ragi
W = what
Ba = barley
Mt = millets

G = gram
T = tur
Pu = other pulses
S = sugarcane
Gn = groundnut

O = Other oilseeds.
C = cotto n
L = plantations
F = fodder
Misc = miscellaneous crops
(—) = negligible or below 500 hectares

NOTE : 1. Figures in brackets represent percentages to gross cropped area.
2. Figures have been rounded off individually and hence Gross totals may not, in some cases, add upto 100.

APPENDIX 4 (Contd.)

(Thousand hectare)

District/taluk	Gross cropped area	Pd	Jk	Jr	B	M	R	W	Ba	Mt	G	T	Pu	S	Gn	O	C	L	F	Misc.
Doda																					
Rainfall Zone—VIII						*Rainfall Pattern—$C_2D_2(C_2D_2)$ $C_1D_1E_2$*															
Doda	16	1 (4)				8 (51)														2 (12)
Ramban	12	1 (8)				10 (85)														
Bhderwa	13	1 (8)				7 (55)		1 (9)		1 (8)			1 (8)							
Punch																					
Rainfall Zone—IX						*Rainfall Pattern—C_2D_2 ($B_2C_1E_1$) $C_1D_1E_2$*															
Haveli	12	1 (10)				8 (70)		2 (15)					0·1 (1)			0·3 (2)				0·3 (2)
Mendhar	17	2 (11)				12 (68)		3 (18)												0·3 (2)
Baramula																					
Rainfall Zone—X						*Rainfall Pattern—C_3D_1 (D_1E_3) $C_1D_1E_2$*															
Baramula	25	8 (32)				5 (20)		4 (16)					2 (8)			1 (4)				5 (20)
Sonawari	18	7 (42)				4 (22)		0·2 (1)		0·1 (1)			4 (20)			1 (5)				2 (9)
Bandipore	8	4 (44)				2 (27)				(9)			1 (9)							1 (7)
Handwara	22	8 (38)				9 (42)		2 (9)	0·2 (1)	(4)			0·2 (1)			(3)				0·6 (2)
Sopore	22	10 (46)				3 (15)		1 (3)		0·4 (2)			3 (15)			1 (3)				3 (16)
Doda																					
Rainfall Zone—XI						*Rainfall Pattern—$C_3D_1(D_3E_1)$ $C_1D_1E_2$*															
Kishtwar	18	1 (6)				6 (33)		2 (12)	3 (17)	4 (24)			1 (6)							0·4 (2)
Anantnag																					
Kulgam	32	19 (58)				10 (30)				1 (4)						1 (4)				1 (4)
Baramula																					
Rainfall Zone—XII						*Rainfall Pattern—C_3D_1 (D_4) $C_1D_1E_2$*															
Karnah	3	0·4 (15)				2 (85)														
Kupwara	21	10 (46)				8 (41)		0·1 (0·4)		0·4 (2)			0·4 (2)			0·1 (1)				2 (8)
Gulmarg	7	4 (53)				2 (26)		1 (13)		1 (4)						1 (4)				1 (4)
Uri	6	1 (15)				5 (78)														

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