Ad-hoc Study No.63

DECENTRALISED PLANNING

IN

AGRICULTURE AND RURAL DEVELOPMENT

(A Study in Chhindwara District of Madhya Pradesh)

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C O N T E N T S

LIST OF TABLES

CHAPTER	TITLE	PAGE NO.
CHAPTER III	AGRO-CLIMATIC REGIONALISATION AND PROFILE OF SUB REGIONS	
3.1	Distribution of blocks in the sub-regions of Chhindwara district	66
3.2	Soil Characteristics and distribution according to Agro-ecological situations in sub-regions of Chhindwara district.	68
3.3	Water availability period and duration of growing season in days	70
3.4	Basic data of sub-regions, Chhindwara district	71
3.5	Land use classification, sub-regions Chhindwara district.	73
3.6	Sources of irrigation, sub regions, Chhindwara district	72
3.7	Number of sources of irrigation, sub-regions Chhindwara district	74
3.8	Crop pattern, sub-regions of Chhindwara district	76
3.9	Area under Kharif and Rabi crops, sub-regions Chhindwara district	75
3.10	Intensity of cropping sub-regions Chhindwara district, T.E.II 88-89.	77
3.11	Irrigated cropped area and extent of irrigation sub-regions Chhindwara district.	78-79
3.12	Fertiliser consumption in sub-regions Chhindwara district, 1988-89	80
3.13	Coverage of High yielding varieties, sub-regions Chhindwara district, 1987-88	81
3.14	Percentage of achievement to target area under different improved practices, sub-regions Chhindwara district(1987-88).	81
3.15	Yield per hectare, sub-regions, Chhindwara district (1988-89)	82
3.16	Livestock population, sub-regions, Chhindwara district	83

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CHAPTER 1

DECENTRALISED PLANNING

1.1 Introduction*

The ultimate objective of the development planning is to maximise welfare of the people. However, the specific objectives of the development can be viewed as varying with the changing social, political and economic value's and standard in a country at different time periods. There are certain specific characteristics of the developing countries such as; (i) poor economic growth; (ii) regional imbalances and uneven distribution of resources; (iii) urban-rural differences, and (iv) high degree of income inequalities. Under these conditions, to achieve maximum welfare for the people, the main objectives of development planning would be to accelerate economic growth, creat conditions for equitable distribution of opportunities for the development of all regions as well as all sections of the population and provide basic amenities to improve living conditions and ultimately achieve quality of life for the entire population.

Considerable advances in economic concepts and theories for planning and economic development have been made during the recent past. There are many approaches to development being evolved and a number of alternative theories and models have been postulated. On the Indian scene, most of these models were tried. While we have been able to achieve spectacular growth in many sectors, the benefits of the development did not percolate down in a desired manner.

Equitable distribution of the benefits of the development between different regions and also between different sections of population continues to be a big challange to the policy planners and the development executives, it is for this reason, the Government of India is keen to modify the planning process in the country by introducing 'decentralised planning'.

*Reproduced from 'Decentralised Planning' concept, scope and Methodology, by B.K. Thapliyal, published in 'Journal of Rural Development' November 1990.

1.2 Agro-climatic regional planning*

Agro-climatic regional planning (ACRP) was initiated by the Planning Commission in 1988. Fifteen agro-climatic zones were formed on the basis of soil and water resources, distribution of rainfall and temperature, etc. A Zonal Planning Team (ZPT) was set up for each zone under the chairmanship of the Vice-Chancellor of an Agricultural University in the region, and involving experts, Senior Officials of the States concerned, farmers and representatives of the financial institutions and of some voluntary groups as members. The ZPTs have submitted reports and made recommendations on the cropping pattern, land and water use management, dairying, fisheries, silviculture, forestry and other agricultural/allied enterprises at the sub-regional level. The analysis of the potential and constraints taken up by the ZPTs indicates that the major focus on the following types of schemes will have a definite impact on the output and productivity of various crops in different regions of the country :

(i) a target of 40 million hectares(ha.) for integrated watershed development programmes;

(ii) a target of over five middion ha for restoration of tank irrigation;

(iii) preparation of operational water delivery systems for 50 per cent of the area under canal irrigation and a target of rehabilition of a quarter of the area under the canal command;

(iv) operational plan of dairying and fisheries development; and

(v) operational plan for high-value low-volume crops such as horticulture, spices and plantation.

*Reproduced from 'Towards a strong resource base' by Har Swarup Singh, published in 'The Hindu, Survey of Indian Agriculture'1990.

ACRP strategies have been reflected in the Plan documents of the various States and this integration is significant in making the ACRP a timely, relevant and practical exercise. The strategies are based on the need for maximum efficiency in resource use in the longterm setting of sustainable agriculture. It has reversed the process from 'development plans and needed resource support' to resource endowment with strategies for optimum use.

In the Eighth Plan, Agro-climatic Regional Planning will be intensified and institutionalised and work below the district level will be taken up on a selective basis with the involvement of elected bodies and local people.

1.3 Inputs, improved practices

The Eighth Plan emphasis will be on the following aspects:

(i) Irrigation development for achieving higher output and productivity; efficient use of irrigation water (through better management, conjunctive use of water, improved irrigation systems, etc; emphasis on minor irrigation; greater sensitivity to environmental dimensions of irrigated farming (both in the phase of construction and of operation), and need for much greater cost consciousness in planning projects;

(ii) Seed multiplication, quality control and their distribution well in time and at reasonable cost;

(iii) Use of fertilizers/manures/biofertilizers in an integrated and balanced manner; use efficiency — its desirability both, in terms of reducing farmers' costs, saving of scarce resources for the economy and preventing serious ecological damage;

(iv) Plant protection integrated pest management;

(v) Mechanisation appropriate machinery equipment and tools;

(vi) Improved package of cultural practices;

(vii) A systematic and critical assessment of the present state of knowledge in terms of availability of economically viable techniques for soil and moisture conservation in dryland areas under different agro-ecological conditions;

(viii) Instead of the present piecemeal interventions in soil conservation, land improvement, afforestation, etc. the integrated watershed development concept needs to be made the centrepiece.

1.4 Institutional infrastructure

The focus during the Eighth Plan will be on the following:

(i) Availability of adequate and timely credit through cooperative and other financial institutions.

(ii) Marketing and agro-processing facilities in the context of the increased emphasis on higher value-added agricultural products; development of better post-harvest technologies; cold storage and suitable transportation and warehousing facilities to increase the shelf-life of the produce.

(iii) Extension services to improve the process of technology transfer.

(iv) Agricultural research, education and training by the State Agricultural Universities and the ICAR System

need to be strengthened, inadequacy of the present arrangements has been felt in many areas, for location-specific and local-adaptive research and with regard to the extent and nature of the farmer-scientist interaction and the feedback; importance of research in frontier areas such as biotechnology, agricultural meteorology and remote sensing, and of anticipatory research will be highlighted.

(v) Technical support to agricultural universities for institutionalising agricultural planning on the basis of homogeneous agro-climatic regions is intended to support this process.

(vi) A policy on infrastructural support for agriculture for education and health, roads and transport and rural electrification.

(vii) The proposed emphasis on local area planning and Panchayati Raj to tailor them to local needs and possibilities, use of voluntary agencies and dedicated individuals in this approach, emphasising decentralisation.

(viii) Land reforms, particularly for ensuring security of tenure and to help small and marginal farmers to get more assure access to credit and other inputs, alongwith land consolidation; improved land records.

(ix) Emphasis on cooperative organisations as instruments of economic and social advancement in rural areas.

1.5 The Objectives

Within the frame of references presented above the broad objectives to which this study is directed are :

(i) To review the organisational structure and methodology adopted for decentralised planning at the district level in Madhya Pradesh.

(ii) To prepare the profile of natural and human resources with focus on delineating agro-climatic regions in the district.

(iii) To highlight various schemes launched in the district, their implementation and problems.

(iv) To identify the constraints in agricultural and rural development.

(v) To suggest the strategy for the future development.

1.6 Selection of the District

For this study Chhindwara district has been selected. It represents typical crop combinations of the state and has significant area under horticultural crops. It has also significant tribal population. The district has 11 blocks and has been divided into three agro-climatic sub regions.

1.7 Data Collection

Secondary data on various aspects of agriculture and allied occupations, demography etc. is being collected block wise from the official records and publication as noted below.

(i) "Agricultural Statistics" Directorate of Agriculture, M.P., Bhopal.

(ii) Department of Land Records, Chhindwara (M.P.) through the office of the Deputy Director of Land Records, Jabalpur (M.P.)

(iii) 'Appraisal Report for strengthening Agricultural Research in Satpura Plateau (Zone No.IX) of J.N. Krishi Vishwa Vidyalaya, Jabalpur' Indian Council of Agricultural Research, New Delhi.

(iv) 'Prospective Plan for 2000 A.D. of J.N.K.V.V.Jabalpur, Directorate of Research Services, J.N.Krishi Vishwa Vidyalaya, Jabalpur.

(v) 'Status Report of Satpura Plateau Region' Regional Agriculture Research Station, J.N.K.V.V., Chhindwara(M.P.)

(vi) 'A Decade of National Demonstrations Project in Chhindwara District, year 1980-90', Krishi Vigyan Kendra Zonal Agricultural Research Station, J.N.K.V.V. Chhindwara (M.P.)

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CHAPTER-2

GENERAL AGRICULTURAL CHARACTERISTICS OF THE STATE AND SELECTED DISTRICT

(I) Madhya Pradesh State

2.1.1 Madhya Pradesh is situated in the heart of India between latitudes 17°-26°N and longitudes 74°- 84°E. It is the biggest state in the country with a total geographical area of 443 lakh hectares. In terms of population (52.1 million at 1981 census). It occupies fifth position in India. Tribals and Harijans form a sizeable proportion of state's population i.e. 22.97 and 14.10 per cent respectively.

2.1.2 Madhya Pradesh is agrarian in character, agriculture forming the most extensive and predominant sector of economic activity of state, employing 80 per cent of the working population.

2.2 Physical Resources

2.2.1 Soils : The main soil types found in the state are alluvial, deep black, medium black, shallow black, mixed red and black, mixed red and yellow and skeletal soils.

2.2.2 Climate : By virtue of its location, the climate of Madhya Pradesh is predominantly moist sub-humid to dry sub-humid, semi-arid to dry sub-humid and semi arid in east, west and Central Plateau & hills, respectively, according to agro-climatic regions of India.

2.2.3 Rainfall :

The annual rainfall received in the state varies from 1600 mm in the eastern district to 800 mm in the northern and western regions. In some years rainfall goes much below of the normal. Most of the rainfall is received in the monsoon season from June to September and about 10 per cent of the rainfall is received in the remaining part of the year.

In the eastern districts, it ranges from 1500 to 1600 mm. in the northern district from 700 to 900 mm. and in the western and Central districts from 1000 to 1200 mm. with the normal rainfall of the state.

In normal years, the total amount of rainfall received in different parts of the state is adequate for the growth of most of the crops. In some parts, it is even quite high and favourable to the growth of crop like rice and sugarcane. There is, however, wide variation in the distribution of rainfall, which leads to instability in productivity and production.

2.2.4 Temperature

The maximum temperature during extreme reaches as high as 45°C and the minimum during winter dips upto 5°C. The maximum normal temperature varies between 25 and 35°C and minimum normal between 10 and 20°C.

The average relative humidity ranges from 40 to 70 per cent throughout the year.

2.2.5 Land use Pattern : Total geographical area of the state may be classified in the following land use categories

(Table 2.1). It indicate that 44.37 per cent of area of the state is the net sown area and 9.74 per cent area is sown more than once. Thus, cropped area of the state is arround half of the geographical area.

Table 2.1 Land utilisation pattern in Madhya Pradesh 90-91

(Area in lakh ha.)

S.No.	Item	Area (lakh ha.)	Percentage
1.	Total Geographical Area	443.43	100.00
2.	Forest	142.11	32.05
3.	Land not available for cultivation.	44.57	10.05
4.	Other uncultivated land excluding fallow	28.34	6.39
5.	Culturable waste land	15.78	3.56
6.	Fallow land	15.88	3.58
7.	Net Area sown	196.73	44.37
8.	Area sown more than once	43.21	9.74
9.	Gross cropped area	239.94	54.11

2.2.6 Irrigation

Irrigation area in the state is just the to half(16%) of the proportionate area irrigated in the country (32%) representing less than one tenth of the total area irrigated.

2.2.7 Sourcewise Irrigated Area :

Wells and canals are still the main source of irrigation. Since during 1989-90 both shared equally (39% each) whereas tubewell shared 7 per cent, tanks. 4 per cent and other sources 11 per cent.

The irrigation facilities increased by 68 per cent during the decade ending 1989-90. However, the created potentials are still under- utilized by about 60 per cent which is a matter of serious concern.

2.2.8 Cropwise irrigated area : The most significant variation was estimated in the case of non-food crops where it increased to 140 per cent during the last decade, which indicates that non-food crops (pulses and oilseeds) are now receiving irrigation which were previously rainfed crops. It further indicate that sub marginal land is now being brought under these crops.

So far as individual crops are concerned, highest increase was found in case of gram (186.7%), followed by cotton (145%) and wheat (93.7%).

2.2.9 Irrigation intensity : There was practically no change in the irrigation intensity which is presently 103 per cent. It also reflects that irrigated double cropped area is fairly stable and needs to be increased through appropriat cropping system and proper water management techniques.

2.2.10 Land holding pattern : The distribution of operational holdings with reference to their number and area for the state as a whole indicated that as compared to 1980-81, during 1985-86 there was 18.6 per cent rise in their number as against 1.0% only in their area. As per Agricultural Census 1985-86, there were 76 lakh holdings which occupied 221.5 lakh hectares of area with an average size of holding of 2.9 hectares.

The distribution of holdings over different size groups is highly skewed. The marginal holdings were 35.9 per cent of the total number but occupied only 5.5 per cent of the total land area, small holdings were 21.2 per cent and occupied 10.6 per cent of area. Semi medium holdings were 21.0 per cent operating on 20.1 per cent of area, medium holdings were 17 per cent with 35.6 per cent of area and large holdings were only 4.9 per cent but they possessed 28.2 per cent of the area.

2.2.11 Major crops and crop sequences : The main crop season are kharif, rabi and summer growing variety of crops in the season under rainfed and irrigated conditions. Nearly 50 per cent of the total geographical area was gross cropped in 1989-90 with an increasing trend. Foodgrains dominated in acreage and among foodgrains, cereals were the major crop. The cropping intensity increased from 113 per cent to 117 per cent during the previous decade. The main crops are paddy, wheat, jowar, tur and gram.

During 1989-90 area occupied by major cereal crops of M.P. was: paddy 22.2%, wheat 14.6%, jowar 7.7%, kodo-Kutki 4.6% and maize 3.9%. The major pulses are gram(9.6%), urid (2.7%) teora (2.2%) and tur (2.0%). The major oilseed crops are soybean (8.3%), linseed (1.9%), groundnut (1.6%) rapeseed and mustared (2.0%) and sesamum (1.1%). The major commercial crops are cotton (2.5%) and sugarcane (0.3%). Of the total cropped area, foodgrains covered 75.3% of which the share of total cereals and total pulses was 55.2% and 20.1% respectively. The remaining area of 24.7% was shared by oil-

seeds (16.2%) and the rest by non-food and other crops (8.5%).

2.2.12 Cropped Area : As the scope for bringing more area under cultivation was practically exhausted, some efforts were made to intensify land use through double cropping (Table 2.2). There has been an increasing trend under net sown, double crop and total cropped area. Between 1957-58 and 1990-91 total cropped area moved up by 45 per cent.

Table 2.2 Changing Trend in total cropped area of M.P.

(Unit (lakh) ha.

Year	Net area sown	Area sown more than once	Total cropped area
1957-58	152.43	13.38	165.81
1967-68	177.97	18.55	196.52
1977-78	187.98	27.10	215.08
1982-83	190.27	31.88	222.15
1983-84	192.25	34.03	226.28
1984-85	192.06	32.01	224.07
1985-86	195.20	36.03	231.23
1986-87	191.02	31.12	222.14
1987-88	194.14	33.87	228.01
1988-89	193.11	33.97	227.08
1989-90	193.33	32.31	225.64
1990-91	196.73	43.22	239.95

2.3 Principal crops : Area, Production and Productivity

2.3.1 Wheat : A significant development in the cropping pattern of the state is the impressive performance of wheat.

The output of wheat went up from 11.22 lakh tonnes during the year 1957-58 to 58.32 lakh tonnes in 1990-91. Wheat yield have shown a significant increase over the last three decades with the introduction of HYV, increase in irrigation and technology adoption. The present level of yield is 1587 kg/ha. (Table .3)

Table 2.3 Area Production and yield of wheat in Madhya Pradesh

Year	Area (lakh ha.)	Production (Lakh tonnes)	Yield (Kg/ha.)
1957-58	25.44	11.22	464
1967-68	26.58	18.81	737
1977-78	35.54	31.63	911
1982-83	35.93	38.01	1104
1983-84	37.80	43.74	1207
1984-85	35.98	39.35	1141
1985-86	37.05	42.02	1134
1986-87	35.02	42.64	1218
1987-88	36.66	45.46	1294
1988-89	36.67	47.97	1665
1989-90	32.84	41.20	1389
1990-91	38.34	58.32	1587

2.3.2 Paddy : The production and yield of paddy in the state during 1957-58 to 1990-91 was modest. Yield of paddy has shown only a modest increase during 1957-58 and 1990-91. Yield of paddy has shown only a modest increase during 1983-84 and further increases during 1990-91 but showed a declining

tendency during 1984-85 and 1986-87 to 1989-90 (Table 2.4). Therefore, intensive research efforts are required to overcome the constraints in paddy production.

Table 2.4 Area, Production and yield of paddy in Madhya Pradesh

Year	Area (lakh ha.)	Production (lakh tonnes)	Yield (kg/ha)
1957-58	39.82	21.21	569
1967-68	41.68	31.87	805
1977-78	47.33	44.37	991
1982-83	48.63	34.51	751
1983-84	49.46	47.99	1027
1984-85	49.57	37.61	802
1985-86	50.32	51.48	1023
1986-87	50.41	41.78	829
1987-88	48.86	42.66	924
1988-89	50.09	46.67	980
1989-90	50.05	44.92	944
1990-91	51.18	57.38	1181

2.3.3 Other cereals : Area under other cereals comprising mainly Jowar, maize and kodo-kutki is small as compared to wheat and paddy in the state. The area under Jowar remained more or less steady during 1957-58 to 1987-88 but declined thereafter. There was no significant breakthrough in the production level of jowar (Table 2.5). Similarly in the maize crop there had been wide fluctuations in the yield levels over years, but overall, it shows an increasing trends in 1990-91, it rose upto 1423 kg/ha (Table 2.6).

Table 2.5 Area, Production and Yield of Jowar in Madhya Pradesh

Year	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
1957-58	19.73	14.05	713
1967-68	25.05	20.80	830
1977-78	19.44	14.61	734
1982-83	20.34	14.01	690
1983-84	21.28	19.83	934
1984-85	19.09	15.20	798
1985-86	19.60	17.73	904
1986-87	19.12	13.01	680
1987-88	20.92	19.19	925
1988-89	17.97	16.22	903
1989-90	17.48	17.36	994
1990-91	16.48	14.79	904

Table 2.6 Area, Production and Yield of Maize in Madhya Pradesh

Year	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg./ha)
1957-58	4.47	1.88	420
1967-68	5.91	6.71	1135
1977-78	6.97	5.74	831
1982-83	7.94	8.04	1022
1983-84	8.31	11.56	1403
1984-85	8.30	11.61	1379
1985-86	8.39	7.09	843
1986-87	8.50	7.60	895
1987-88	8.48	8.73	1037
1988-89	8.60	11.94	1400
1989-90	8.79	14.58	1674
1990-91	8.77	12.37	1423

2.3.4 In kodo-kutki crop, not withstanding, a fall in area, production of this cereals went up some what. Production increased significantly due to improvement in yield. The growth in production in kodo-kutki (2.65 lakh tonnes) during 1990-91 was brought about by an increase in yield (269 kg/ha). The productivity of lessor millets, though nearly doubled, but still the level is too low (Table 2.7).

Table 2.7 Area Production and yield of kodo-kutki in Madhya Pradesh

Year	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
1957-58	12.38	1.48	120
1967-68	13.62	3.14	231
1977-78	13.13	3.36	256
1982-83	11.68	2.12	182
1983-84	11.78	3.01	257
1984-85	11.30	2.48	220
1985-86	11.42	2.82	248
1986-87	10.74	1.92	179
1987-88	10.55	2.93	279
1988-89	10.30	2.23	217
1989-90	10.11	2.29	227
1990-91	9.93	2.65	269

2.3.5 Gram

Among pulses gram is the most important crop grown all over the state. Area under gram increased 70 per cent between 1957-58 to 1990-91. Output of gram registered more than three times during the same period from 6 lakh tonnes during the year 1957-58 to 18.92 lakh tonnes during the year 1990-91. The increase in output during 1957-58 to 1990-91 was contributed both by rise in area and yields as may be seen below (Table 2.8).

Table 2.8 Area, Production and Yield of Gram in Madhya Pradesh

Year	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
1957-58	14.66	6.00	409
1967-68	15.04	8.27	550
1977-78	17.80	9.07	510
1982-83	23.87	16.44	689
1983-84	21.06	14.25	677
1984-85	20.76	13.03	628
1985-86	22.81	15.57	688
1986-87	21.18	14.80	668
1987-88	22.36	14.84	664
1988-89	22.37	15.67	701
1989-90	21.57	14.27	662
1990-91	24.62	18.92	769

2.3.6 Tur : Another pulse grown in the state is tur. There was an increase in production of tur during the last three decades. From 2.15 lakh tonnes during the year 1957-58, production increased to 4.37 lakh tonnes during the year 1990-91. The steady improvement in production of tur during the last 32 years was largely due to a substantial increase in the area (Table 2.9).

Table 2.9 Area, Production and Yield of Tur in Madhya Pradesh

Year	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
1957-58	3.78	2.15	668
1967-68	4.74	3.08	651
1977-78	4.88	3.52	725
1982-83	4.96	3.35	678
1983-84	5.08	5.10	1009
1984-85	4.93	4.01	817
1985-86	4.80	4.10	859
1986-87	4.37	4.13	945
1987-88	4.54	4.17	924
1988-89	4.52	5.97	1331
1989-90	4.42	4.17	949
1990-91	4.42	4.37	995

2.3.7 Soybean : Major oilseed crop grown in the state is soybean. State's soybean production increased from 0.02 lakh tonnes during the year 1957-58 to about 22 lakh tonnes during the year 1990-91. Both area and yield contributed to the increase in production. During the period 1957-58 to 1990-91 area increased from 0.05 lakh ha to 21.49 lakh ha. Yields increased from 426 kg/ha during the year 1957-58 to 1016 kg/ha during the year 1990-91 (Table 2.10). Soybean crop cover a large area showing highest percentage of state to India 79.1 and 38.5 respectively. The same crop stand top in production percentage of state to India of 78.3 and 41.0 respectively.

Table 2.10 Area, Production and Yield of Soybean in Madhya Pradesh

Year	Area (lakh ha)	Production (Lakh tonnes)	Yield (Kg/ha)
1967-68	0.05	0.02	426
1977-78	0.90	0.42	469
1982-83	4.58	2.80	622
1983-84	6.14	4.62	752
1984-85	9.87	7.70	780
1985-86	10.96	8.29	756
1986-87	12.10	6.77	560
1987-88	13.29	7.67	577
1988-89	13.88	12.54	903
1989-90	18.77	14.96	797
1990-91	21.49	21.83	1016

2.3.8 Groundnut : Another major oilseed crop of the state is groundnut. Area under groundnut during the 32 years period remained more or less steady. Production was maintained at around 2.50 lakh tonnes. Yield increased from 608 Kg/ha during the year 1957-58 to 781 kg/ha during the year 1990-91 (Table 2.11). Yield trends of groundnut, the important oilseed crop can not be considered as satisfactory. There is a stagnation in productivity which is hardly 650 Kg/ha on an average. Intensive research efforts are required to over come this problem of low productivity.

Table 2.11 Area, Production and yield of Groundnut in Madhya Pradesh

Year	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
1957-58	3.71	2.33	628
1967-68	4.03	3.35	831
1977-78	4.37	2.48	367
1982-83	3.49	1.79	513
1983-84	3.42	2.32	745
1984-85	3.02	1.60	532
1985-86	2.57	1.70	661
1986-87	2.44	1.89	775
1987-88	2.63	2.46	933
1988-89	3.02	3.35	1109
1989-90	3.66	2.72	743
1990-91	3.20	2.50	781

2.3.9 Sesamum : Sesamum, which covered hardly 2.5 lakh hectares during 1990-91 also lag behind in productivity level. It could never cross 300 kg/ha yield inspite of efforts made so far. (Table 2.12)

Table 2.12 Area, Production and Yield of Sesamum in Madhya Pradesh

Year	Area (lakh ha)	Production (Lakh tonnes)	Yield (Kg/ha)
1957-58	3.22	0.46	142
1967-68	4.30	0.48	112
1977-78	2.50	0.42	170
1982-83	2.57	0.28	110
1983-84	2.59	0.47	181
1984-85	2.60	0.43	168
1985-86	2.33	0.47	200
1986-87	2.09	0.20	096
1987-88	2.06	0.43	212
1988-89	2.17	0.58	268
1989-90	2.37	0.74	312
1990-91	2.43	0.55	227

2.3.10 Rape & Mustard : Some break-through could be achieved in the productivity of rape and mustard increase. It rose from 276 to 926 kg/ha. There is a sufficient scope to increase it further (Table 2.13).

Table 2.13 Area, Production and Yield of Rape-Mustard in Madhya Pradesh

Year	Area (Lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
1957-58	0.93	0.26	276
1967-68	1.43	0.40	279
1977-79	2.53	0.85	338
1982-83	2.78	1.40	505
1983-84	3.12	2.32	749
1984-85	3.55	2.42	687
1985-86	3.38	1.82	538
1986-87	3.31	2.08	628
1987-88	4.40	3.28	746
1988-89	4.37	3.92	897
1989-90	4.50	3.43	766
1990-91	5.71	5.26	926

2.3.11 Linseed : Yield level of linseed which is consumed mostly by poor trodden is also far below satisfaction. It could hardly touch 369 kg/ha as maximum level of productivity. Hence require attention with particular reference to varietal improvement and plant protection technology (Table 2.14)

Table 2.14 Area, Production and Yield of linseed in Madhya Pradesh

Year	Area (lakh ha)	Production (lakh tonnes)	Yield (Kg/ha)
1957-58	4.23	0.55	130
1967-68	5.66	1.35	239
1977-78	7.41	1.79	242
1982-83	5.55	1.30	234
1983-84	5.85	1.64	281
1984-85	5.74	1.27	221
1985-86	6.20	1.38	222
1986-87	4.69	1.25	266
1987-88	4.84	1.79	369
1988-89	4.78	1.25	263
1989-90	4.38	1.25	248
1990-91	4.41	1.19	270

2.4 Horticultural Crops

2.4.1 Out of the gross cropped area of the state, fruits and vegetables covered 0.8 per cent area, whereas spices shared 0.9 per cent area.

2.4.2 The fruit crops grown in the state are papaya, banana, guava, orange, mango and lemon. Including other fruits, the total area under fruits was 52.17 thousand hectares.

2.4.3 Among vegetables, potato, sweet potato and onions are widely grown. Including other vegetables, the total area under vegetables was 187.13 thousand hectares.

2.4.4 In case of spices, chillies, carriander, garlic, ginger and turmeric are the major ones. Including other spices total area covered under spices was 205.88 thousand hectares and the productivity in tonnes per hectare for garlic was 3.41, followed by ginger (1.35), turmeric(0.98), Chillies (0.3) and corriander (0.30). It may be noted that out of total spices, corriander alone covered 48.6 per cent area during 1987-88.

2.5 Livestock

2.5.1 The State possess 11.1 per cent of the total live-stock of the country representing 14.9 per cent of cattle, 11.3 per cent of buffaloes. As per livestock census 1987, there were 282 lakh cattles, 73 lakh buffaloes and 0.72 lakh other livestock totalling at 456 lakhs.

2.5.2 The poultry is a growing enterprise in the state with 80 lakhs birds representing 4.3 per cent of the country's poultry population.

2.6 Fertilizer Consumption

2.6.1 In state, during 1988-89, 6.84 lakh tonnes of different fertilizers were consumed against 110.40 lakh

tonnes in the country. The consumption of nitrogenous, phosphatic and potassic fertilizers in the state during 1988-89 was 3.87, 2.58 and 0.39 lakh tonnes, respectively.

2.6.2 In terms of nutrient consumption per hectare, nitrogen application stood at 16.8 kg/ha, phosphorus at 11.2 kg/ha and potash at 1.7 kg/ha totalling to 29.7 kg/ha in state which is about half of the national average.

2.7 High Yielding Varieties

2.7.1 The share of high yielding varieties in total area under crops in the state is paddy 38.9%, wheat 48.5%, jowar 50.7%, maize 29.4 % and bajra 30.7 per cent. The overall coverage of all high yielding varieties was 43 per cent of the cropped area of the crops.

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(II) Chhindwara District

2.8 Physical Resources

2.8.1 Situation : Chhindwara districts lakes its name from the headquarter town, which in its turn is believed to be drawn from Chhind of date-palm tree. The district is situated on the Satpura plateau between 21°28' and 22°49' North latitudes and 78°10' and 79°24' East longitudes at a height of 682 meters above mean sea level. It is bounded in the north by Hoshangabad and Narsinghpur districts in west Betul and in east Seoni district

2.8.2 Size-Area : The district Chhindwara has a total geographical area of 11,852 sq.km. with 10th position contributing 2.67% area of the state.

2.8.3 Population : According to 1981 census the population of the district was 12.33 lakhs. The population of the district has increased from 4.07 lakhs in 1901 to 12.33 lakhs in 1981 (Table 2.15.

Table 2.15 Variation of Population in Chhindwara district from 1901 to 1981

Year	Total Population	Percentage of increase or decrease to last decade
1901	4,07,999	-
1911	5,17,109	+ 26.74
1921	4,91,835	- 4.89
1931	5,73,272	+ 16.56
1941	6,10,707	+ 6.53
1951	6,46,403	+ 5.85
1961	7,85,535	+ 21.52
1971	9,90,341	+ 26.07
1981	12,33,131	+ 24.52

2.8.4 The population growth in 40 years from 1911 to 1951 was 1,29,294 whereas in the decade 1951-1961 the increase was 1,39,132 followed by an increase of 2,04,806 in the decade 1961-71. A remarkable feature is that the decinial growth rate between 1931-41 and 1941-51 were 6.5 and 5.9 only.

2.8.5 Administrative Units: The district is divided into 7 tahsils : Chhindwara, Pandhurna, Sausar, Parasia, Amarwara, Chourai and Jamai. Each tahsil is also a sub-division for revenue and general administration purpose. There are 11 development blocks in the district.

2.8.6 Communication: The spread of railways in the district is poor. A total distance of 84 Kms is covered by broad gauge and 145 Kms. by narrow gauge. Chhindwara town is connected with Seoni, Nagpur and Parasia by narrow gauge. Parasia, another town of the district is also connected with Amla in Betul district by a broad gauge line. An important railway route Delhi-Nagpur-Madras (B.G.) passes through the south western corner of the district and Pandhurna an important town and Block Headquarter in the district is a station on it. (Table 2.16)

Table 2.16 Details of Railway Routes in the District :

Route	Gauge	No.of station	Distance in Km.
Delhi-Itarsi-Nagpur	Broad Gauge	3	32
Amla Parasia	Broad Gauge	6	52
Nagpur-Chhindwara	Narrow Gauge	10	69
Chhindwara-Seoni	Narrow Gauge	7	42
Chhindwara-Bardui	Narrow Gauge	8	34

2.8.7 Road links of the district are also poor. There is no National Highway passing through the district. There are five State Highway roads all emanating from Chhindwara. These roads connect Chhindwara with Multai in Betul district, Piparia in Hoshangabad district, Narsinghpur, Seoni and Nagpur (Table 2.17)

Table 2.17 Details of Road- Links (State Highways) in Chhindwara District

State Highways	From	To	Distance in the district (Km)
Chhindwara-Narsinghpur	Chhindwara	Border	96
Chhindwara-Seoni	"	"	53
Chhindwara-Nagpur	"	"	72
Chhindwara-Multai	"	"	48
Chhindwara-Matkuli	"	"	104

2.8.8 Topography : The whole of the Chhindwara district lies in the Satpura Range of mountains on a height of about 1100-3000 ft.above sea level. The district may be divided into three natural regions, corresponding to three steps ascending from south to north. The lowest step rises steeply from Nagpur plain and forms the bulk of Sausar Tahsil. The second step has hills rising from the central plateau to high elevations upto 2000 ft. It consist of central part of the district comprising southern portion of Amarwara tahsil, major part of Chhindwara tahsil and the northern part of Sausar tahsil. The third step forms the northern part of the district and consists of the slopes from Satpura hills to the Narmada Valley. The highest ridge of the Satpura which lie from east to west forms the

water shed between the Narmada Valley and portions south to it. The general slope of the district is south-ward. The whole of the district is intersected by rivulets and streams. Small hills are scattered all over the plateau.

2.8.9 Rivers : The chief rivers of the district are Kanhan, Pench and their tributories which flow towards south. Other rivers are Shakkar, Sitarewa and Dudhi which flow towards north.

2.8.10 Climate and Rainfall : District Chhindwara is having comparatively mild climate. In terms of climatic variation, year, can be divided into 4 district season, viz. cold season from December to February, summer season from March to middle of June or retreating mansoon season from October to November. Based on the data maintained in 6 raingange stations in this district the average annual rainfall comes to be 1269 mm. varying from 1035.3 mm. at Sausar to 1823.6 mm. at Tamia. The average number of rainy days comes to be by (with rainfall 2.5 mm. or more) varying from 59 at Sausar to 73 at Harai Tamia. Based on 50 years of data the lowest annual rainfall (56% of the normal) occurred in 1902 and highest (143% of the normal) in 1950. The rainfall generally increases from west to east. The temperature increases rapidly in early March. May being the hottest months with the mean daily maximum temperature as 39.4°C and minimum 26.1°C(Table 2.18). By the middle of June the temperature drops appreciatly with onset of monsoom which after a slight increase at the end of September of early October decreases rapidly. January is the coldest month with the maximum and minimum temperature

Table 2.1§ Mean maximum and minimum temperature (°C) in Chhindwara

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Chhindwara	Max.	25.5	29.0	32.9	36.4	39.4	35.2	28.4	27.7	29.0	29.3	27.7	26.3	30.6
Mean	Min.	10.6	12.8	17.0	21.9	26.1	34.9	22.4	21.9	21.3	17.7	11.8	9.8	18.2
	Average	18.0	20.9	24.9	29.1	32.7	30.0	25.7	29.8	25.1	23.5	19.7	18.0	24.4

II. Mean rainfall(mm) and number of rainy days in Chhindwara

Chhindwara	a.	19.4	27.1	19.7	13.3	16.9	178.2	395.7	306.2	306.1	57.8	22.1	9.6	1279.1
Mean	b.	1.7	1.9	1.7	1.1	1.5	9.6	16.7	14.2	10.2	3.1	1.3	0.9	64.1

a. Normal rainfall b. Average number of rainy days (days with average rain of 2.5mm)

III. Mean relative humidity (%) in Chhindwara

Chhindwara	M.	67	52	39	34	33	64	87	87	82	71	58	65	62
Mean	E.	37	25	21	22	22	53	77	79	72	51	35	35	44

M. Morning E. Evening.

as 25.5°C, respectively. Due to cold wave the minimum temperature may drop down to about 3°C. The relative humidity which generally exceeds 70% during the south west monsoon season decreases in the post monsoon season the driest part of the year being summer with relative humidity less than 25% in the afternoon.

2.8.11 Temperature : The maximum temperature which is the highest during the months April, May and June which varies from (38°-42°C). The temperature starts deceasing from Mid-June onwards or 25th week (38°C Max.-25°C mini.) and come down to 26°C Max-22°C Mini. during middle of August (33rd week). The temperature remains constant till middle of December except the duration 15th September to 31st October, where it fluctuates from 28° to 30°C. The minimum temperature is the lowest of 5.8° and 4.6°C which can be observed during end of December to middle of January. During 1st April to 10th October, the minimum temperature is always greater than 20°C.

2.8.12 Humidity : The relative humidity is higher during peak of monsoon (above 88%) and the lowest in the summer season (36%). The percentage of humidity increases or decreases with the monsoon fluctuation. During 25th March to 25th June, less than 50 per cent of humidity is observed, lowest being 36% during April month. (Table 2.1)

Table 2.18 Mean monthly rainfall data of Chhindwara district

Months	Rainfall	Rainy days
January	42.0	4
February	28.0	3
March	-	-
April	-	-
May	-	-
June	160.0	7
July	291.0	14
August	390.0	15
September	208.0	10
October	25.0	3
November	25.0	4
December	21.0	2
Mean Annual Rainfall(mm.)	1220.0	62
Grand Mean	1194.0	66

Source : Office of Deputy Director of Agriculture

2.8.13 Soils : The black soils of the plateau are well suited for wheat and gram. The best wheat tract of the plateau is its south eastern portion. The north eastern part of the plateau is also black soil tract but it is cut frequently by hills which are suitable for millets only. The south and western portion has yellow soils. The rest of the west portion is suited for Kharif crops mostly millets. The higher plateau in the north also grow kharif crop chiefly the kodo-kutki and niger.

2.8.14 Soils are generally low in available nitrogen and low in medium in phosphorus and medium to high in potash. The soils of the hilly tracts are almost eroded and are poor in water holding capacity. The shallow black soils in plains have better fertility as well as good water holding capacity.

2.8.15 Forests : The district is endowed with rich forest resources. Nearly 23 per cent of the area in the district is covered with forests. The forests of the district are of the tropical dry deciduous type and teak is the most important specie found in the area. The district is divided into three Forest Divisions :

(i) Eastern Chhindwara Division consisting roughly of the eastern halves of the Chhindwara and Amarwara tahsils. It is further divided into 8 ranges. The forest of this area are dry deciduous type of pure teak and mixed forests.

(ii) Western Chhindwara Division consists of western halves of the two tahsils. It consists of 7 forest ranges. It is transition zone of teak and sal combined with mixed forests.

(iii) South Chhindwara Division is Sausar tehsil. It also contains 7 forest ranges. Best quality teak occurs in this division. Alongwith the teak khair forest and mixed forests also occur.

2.8.16 The important varieties of trees found in the forests of Chhindwara are :

Khair, Sal, Harra, Sagon, Bija, Salai, Tendu, Tinsa, Karil, Bhirra, Jamun, Pakar, Palas, Babul, Bhilma, Bel, Ber, Gular, Imli, Mahua, Pipal, Semal, Baheda, Amla, etc. and the important forest produce include Timber, Fuel wood, Tendu leaf, Harra Bamboo, Gum, Chironji, Lac and fodder grass etc.

2.9 Agricultural Resource Inventory

2.9.1 Agriculture was the most important occupation in the district of the total population 39.74 per cent were workers and 60.26 per cent were non workers. Further, of the total workers 47.68 per cent were cultivators and 29.27 per cent agricultural labourers. Thus 76.95 per cent of the workers earned their livelihood from agriculture. (Table 2.20).

Table 2.20 Occupational distribution of population Chhindwara district- 1981

Occupation	Number	Percentage to total workers	Percentage to total population
Cultivation	2,33,600	47.68	-
Agricultural labour	1,43,416	29.27	-
Household Industry	13,292	2.71	-
Others	99,628	20.34	-
Total Workers	4,89,936	100.00	39.74
Non workers	7,42,799	-	60.26
Total Population	12,32,735	-	100.00

Source : Census of India- 1981, Series 11, Madhya Pradesh

2.10 Agricultural Situation

2.10.1 Land Utilisation : The most significant feature of land use in the district is the high percentage of forest area. It is 22.62 per cent of total geographical area. Net area sown in the district comprised 41.48 per cent and fallow 5.72 per cent. Nearly 8 per cent of total area was not available for cultivation and 1.93 per cent was cultivable waste. (Table 2.21 Fig.1)

2.10.2 During the last ten years period there has not been any change in the land use pattern of the district except about 23 per cent of the reporting area which was covered under forests.

Table 2.21 Land use pattern in Chhindwara district,

(Area- thousand hectares)

Particulars	Trienium 1978-79		Ending 1988-89	
	Area	Percentage	Area	Percentage
1. Forest	443.7	37.44	268.0	22.62
2. Land not available for cultivation	87.0	7.34	100.1	8.44
(a) Land put to non-agricultural use	44.7	3.77	50.4	4.25
(b) Barren and un-cultivated land;	42.3	3.57	49.7	4.19
3. Other cultivated land excluding fallow	60.1	5.07	56.9	4.80
(a) Permanent pasture and other grazing land	56.9	4.80	56.9	4.80
(b) Land under misce-llaneous tree crops and goves	3.2	0.27	-	-
4. Cultivable waste land	36.2	3.06	22.9	1.93
5. Fallow Land	77.1	6.51	67.8	5.72
(a) Current fallow	38.8	3.28	35.3	2.98
(b) Old Fallow	38.3	3.23	32.5	2.74
6. Net Area sown	480.9	40.58	491.53	41.48
7. Geographical Area	1185.0	100.00	1185.0	100.00

2.10.3 Irrigation :

The main source of irrigation in the district are wells (including tubewells) which irrigate 86.8 per cent of the total irrigated area the percentage was 94.0 in the earlier triennium. The canals commanded 6.62 per cent. In the earlier triennium the percentage was only 0.8 per cent. It clearly showed that major part of the district is still under rainfed cultivation. (Table 2.22)

Table 2.22 Irrigated Area by sources, Chhindwara district T.E. 1978-79 and 1988-89

(Area in thousand hectare)

Sources	T.E.I		T.E.II	
	Area	%	Area	%
Canals	0.3	0.8	4.3	6.62
Tanks	0.3	0.8	0.7	1.1
Wells including tubewells	36.5	94.0	56.3	86.8
Other sources	1.7	4.4	3.6	5.5
Gross irrigated area	38.8	100.0	64.9	100.00

2.10.4 Cropping Zones : On account of the wide range of climatic and physical conditions, different types of agricultural practice are prevelent in different parts of the district. Most of the area is single cropped either to Rabi or kharif. Double cropping is restricted to only irrigated areas. The district is divided into three cropping zones.

(i) Triple cropping zone

Blocks- Parts of Chhindwara, Mokhed and Parasia blocks. Vegetables occupy important place in the crop rotations which include Jowar, Maize, wheat, sugarcane and other crops.

LAND USE CLASSIFICATION IN
CHHINDWARA DISTRICT T. E.1978-79 & 1988-89

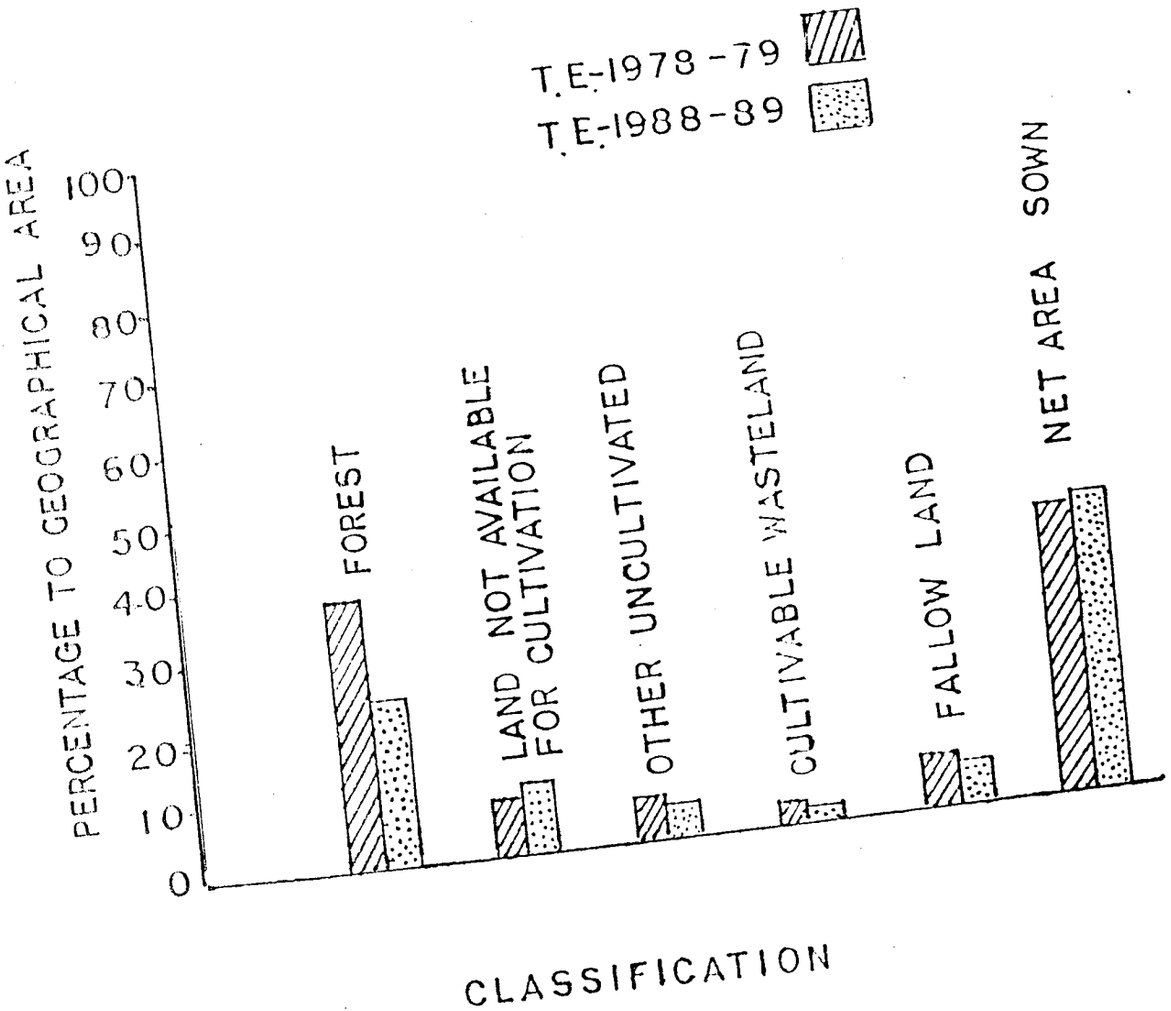


Fig.1

(ii) Double Cropping Zone

Blocks- Sausar, Pandurana, Parasia, Chaurai and parts of Mokhed and Chhindwara blocks.

Common crop rotation of this zone are :

Cotton	-	Groundnut
Contton	-	Wheat
Jowar, Moong, Urd	-	wheat

(iii) Mono Cropping Zone

Blocks- Amarwara, Harrai, Tamiya, Jamai, Bichhua

Kodo- kutki- Maize- Jagri are the main crops of this tract.

2.10.5 Cropping Pattern : The district of Chhindwara falls in Jowar-wheat zone of the State and these two crops occupy 29 per cent of the total cropped area of the district. Kodo-kutki and Jagni (Ramtil) which are generally grown in inferior soil, are other crops of importence occupying 12 per cent and 7 per cent of the total cropped area respectively. The cropping pattern was similar in the earlier triennium but for some very minor variation (Table 2.23). The cropping pattern of the district was food crops oriented.

2.10.6 Most significant feature of the cropping pattern in district is that bulk of the cropped area is devoted to kharif crops (nearly 70 per cent) which generally depend on monsoon rains. Among Rabi crops wheat and gram together occupy 19 per cent of the total cropped area. The important non food crops include Jagni (Ram Til) and groundnut among oilseeds and cotton as fibre. Fruits and vegetables occupy only 2 per cent of the total cropped area. Their cultivation

Table 2.23 Cropping Pattern, Chhindwara district, triennium ending 1978-79 and 1988-89

(Unit- Thousand hectares)

Crop	T.E.I		T.E.II	
	Area	Percentage to gross cropped area	Area	Percentage to gross cropped area
Paddy	25.0	4.71	25.6	4.53
Wheat	71.6	13.50	78.8	13.95
Maize	22.2	4.18	37.3	6.60
Jowar	64.6	12.18	79.5	14.07
Bajra	0.3	0.06	0.1	0.02
Kodo-Kutki	78.0	14.70	68.1	12.06
Other cereals	12.6	2.38	9.0	1.59
Total cereals	274.3	51.71	298.4	52.82
Gram	37.3	7.03	26.8	4.75
Tur	29.5	5.56	30.5	5.41
Urad	57.9	10.92	33.7	5.96
Moong-Moth	16.0	3.02	10.5	1.86
Teora	2.3	0.43	1.6	0.28
Masoor	3.4	0.64	1.5	0.26
Peas	2.2	0.41	2.2	0.39
Other cereals	3.2	0.60	1.6	0.28
Total Pulses	151.8	28.61	108.4	19.19
Total cereals & pulses	426.1	80.32	406.8	72.01
Sugarcane	8.5	1.60	8.4	1.49
Spices	2.5	0.47	3.1	0.55
Fruits & Vegetables	8.3	1.56	11.2	1.98
Total Food crops	445.4	83.96	429.5	76.03
Groundnut	23.2	4.38	28.4	5.03
Sesamum	2.4	0.45	2.5	0.44
Ramtil	45.9	8.66	37.6	6.66
Linseed	2.3	0.43	1.6	0.28
Other Oilseed	0.4	0.07	56.2	9.95
Total oilseed	74.2	13.99	126.3	22.23
Cotton	9.6	1.80	8.0	1.42
Other Fibre	1.3	0.25	1.1	0.19
Total Fibre	10.9	2.05	9.1	1.61
Total Non food crops	85.1	16.04	135.4	23.97
Gross Cropped Area	530.5	100.00	564.9	100.00

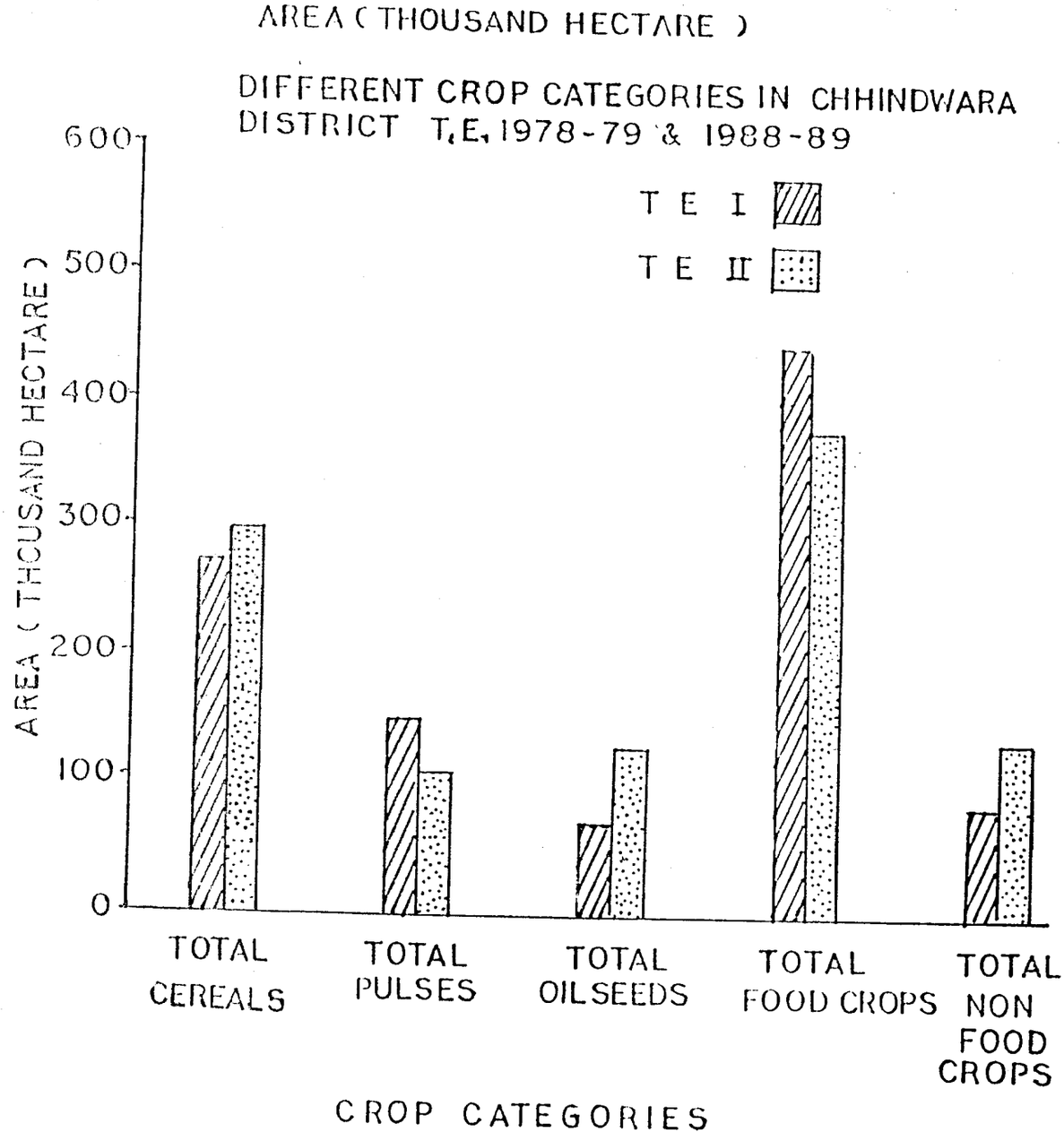

AREA (THOUSAND HECTARE)
DIFFERENT CROP CATEGORIES IN CHHINDWARA DISTRICT T.E. 1978-79 & 1988-89
T E I
T E II
600
500
400
300
200
100
0
AREA (THOUSAND HECTARE)
TOTAL CEREALS
TOTAL PULSES
TOTAL OILSEEDS
TOTAL FOOD CROPS
TOTAL NON FOOD CROPS
CROP CATEGORIES

Fig.2

is concentrated in certain pockets of the district e.g. vegetable farming in part of Chhindwara, Mokhed and Parasia blocks and orange orchards in Pandurana block. Yet Chhindwara is an important producer of potato, early cauliflower and orange.

2.10.7 Of the different crops wheat, gram, fruits, vegetables, spices and sugarcane are the main irrigated crops which together share 97 per cent of the total irrigated area in both the triennia. (Table 2.24, Fig.2)

Table 2.24 Cropwise Irrigated area Chhindwara district T.E.I and T.E. II

(Area in hectares)

Crop	Cropwise Irrigated area	Percentage of Irrigated area to total irrigated area	Percentage of irrigated area under the crop to total area of crop	Cropwise Irrigated area	Percentage of irrigated area to total irrigated area	Percentage of irrigated area under the crop to total area of crop
Rice	13.3	0.03	0.05	2	-	-
Wheat	18936.7	48.8	26.4	34277	54.4	43.49
Maize	17.0	0.04	0.1	5	0.1	0.01
Total cereals	18973.3	48.9	6.9	34342	54.5	11.51
Gram	3656.7	9.4	9.8	5680	9.0	21.20
Other Pulses	810.0	2.1	0.7	1344	2.2	1.64
Total Pulses	4466.7	11.5	2.9	7034	11.2	6.49
Sugarcane	6056.7	15.6	99.8	8404	13.3	100.00
Fruits & Vegetables	7536.6	19.4	91.0	10586	15.8	93.86
Spices	1433.3	3.8	58.5	2220	3.5	70.88
Linseed	23.3	0.1	1.1	41	0.2	2.58
Cotton	260.0	0.7	2.7	265	0.5	3.32
Tobacco	3.0	-	11.2	-	-	-
Total	38800	100.0	7.3	63036	100.00	11.14

2.10.8 High Yielding Varieties :

High yielding varieties are available for four cereal crop only viz., wheat, rice, jowar and maize. Out of these crops wheat and jowar are important in Chhindwara district. The coverage of high yielding varieties for paddy was 0.05 per cent and that for wheat 18.44 per cent for triennium-II. these facts are reflected in the progress of high yielding varieties programme (Table 2.25)

Table 2.25 High yielding varieties coverage Chhindwara District T.E.-I and T.E.-II

(Area in Hectare)

Crop	H.Y.V.area T.E.I	%	H.Y.V.area T.E.II	%
Paddy	1066	3.32	18	0.05
Wheat	19400	60.38	12543	36.18
Jowar	10300	32.05	15716	43.33
Maize	1366	4.25	6394	18.44
	32132	100.00	34671	100.00

The percentage of coverage of high yielding varieties of paddy in the first triennium in the district was 3.32. It decreased to 0.05 in the second triennium wheat area under HYV, on the other hand, received a great set back in second triennium when it decreased to 36.18 per cent. Jowar area under HYV has been increasing steadily from 32.5 per cent in the first triennium to 43.33 per cent in the second triennium. Similarly maize area under HYV has also been increasing from 4.25 per cent to 18.44 per cent between two triennium. In both jowar and maize there is yet large scope for the expansion of High Yielding Programme.

2.11 Area, Production and Productivity

2.11.1 Data on area, production and productivity of principal crops in this district during the triennium ending 1978-79 and 1988-89 are presented in Table 2.26. During past decade area under paddy has remained stagnant. However, there has been improvement in its productivity. Wheat and Jowar have the potential for developing as a major crops in the district. However there have been practically some increase in area sown to these crops over the past decade. There has been some decrease in area sown to kodo-kutki crop presumably replacing by wheat and jowar crops.

2.11.2 Among oilseed soybean has the largest coverage. The productivity of soybean in the district is always higher than its average productivity in Madhya Pradesh. In fact out of 45 district in Madhya Pradesh the highest yield of soybean during the last five years has been from Chhindwara district.

2.11.3 The figure 3 shows at a glance the trend in foodgrain production between triennia ending 1978-79 and 1988-89.

2.11.4 Trends in yields of important crops have shown a significant increase over the last triennium ending 1978-79 as may be seen in Figure 4.

Table 2.25 Production and Productivity of Principal crops in Chhindwara district during the two triennium periods

T.E.I

Area - 000 ha
Production - 000 tonnes
Productivity - kg/ha.

Crop	Area under the crop	Cropped area as % of Gross cropped area in the district	Crop area as % of total area of crop in M.P.	Production	Productivity
Paddy	25.0	4.71	0.53	11.96	478
Wheat	71.6	13.50	2.05	32.13	449
Maize	22.2	4.18	3.20	16.43	740
Jowar	64.6	12.18	3.40	44.80	693
Bajra	0.3	0.06	0.16	0.13	433
Kodo-Kutki	78.0	14.70	5.96	6.66	85
Other Cereals	12.6	2.38	2.63	3.50	28
Total Cereals	274.3	51.71	2.15	115.63	421
Gram	37.3	7.03	2.02	11.66	312
Tur	29.5	5.56	6.01	21.06	713
Urad	57.9	10.92	8.78	9.80	169
Moong-Moth	16.0	3.02	7.00	2.80	175
Teora	2.3	0.43	0.31	2.70	1174
Masoor	3.4	0.64	1.09	0.76	223
Peas	2.2	0.41	2.22	0.43	195
Other Pulses	3.2	0.60	0.95	0.80	250
Total Pulses	151.8	28.61	3.22	48.03	316
Total Cereals & Pulses	426.1	80.32	2.43	163.66	384
Sugarcane	8.5	1.60	8.13	11.67	1373
Spices	2.5	0.47	2.35	5.55	2220
Fruits &Vegetables	8.3	1.56	5.83	32.78	3949
Total Food Crops	445.4	83.96	2.49	213.67	479
Groundnut	23.2	4.38	5.09	9.86	425
Sesamum	2.4	0.45	0.97	0.23	95
Ramtil	45.9	8.66	9.48	5.13	112
Linseed	2.3	0.43	0.31	0.43	187
Other Oilseed	0.4	0.07	0.92	0.06	150
Total Oilseed	74.2	13.99	3.80	15.73	212
Cotton	9.6	1.80	1.46	3.60	375
Other Fibre	1.3	0.25	4.14	0.90	695
Total Fibre	10.9	2.05	1.59	4.50	412
Total Non-Food crops	85.1	16.04	2.36	20.24	237
Grand Total	530.5	100.00	2.47	233.90	441

Table 2.25 Continued....

Crop	T.E.II				
	Area under the crop	Crop area as % of gross cropped area in the district	Crop area as % of total area of crop in M.P.	Production	Productivity
Paddy	25.6	4.53	0.51	19.84	775
Wheat	78.8	13.95	2.18	111.30	1412
Maize	37.3	6.60	4.16	70.46	1889
Jowar	79.5	14.07	4.10	105.65	1329
Bajra	0.1	0.02	0.06	0.09	900
Kodo-kutki	68.1	12.06	6.46	15.56	228
Other Cereals	9.0	1.59	2.31	4.28	475
Total Cereals	298.4	52.82	2.30	327.22	1096
Gram	26.8	4.75	1.20	27.36	1020
Tur	30.5	5.41	6.81	78.26	2566
Urad	33.7	5.96	4.30	12.12	360
Moong-Moth	10.5	1.86	5.43	3.57	340
Teora	1.6	0.28	0.29	1.90	1187
Masoor	1.5	0.26	0.49	1.09	726
Peas	2.2	0.39	0.96	0.56	254
Other Pulses	1.6	0.28	1.73	0.23	144
Total Pulses	108.4	19.19	2.30	125.09	1153
Total Cereals & Pulses	406.8	72.01	2.29	452.31	1111
Sugarcane	8.4	1.49	10.33	35.83	4265
Spices	3.1	0.55	1.69	4.30	1387
Fruits & Vegetables	11.2	1.98	5.67	51.13	4565
Total Food Crops	429.5	76.03	2.36	543.58	1265
Groundnut	28.4	5.03	10.08	37.46	1319
Sesamum	2.5	0.44	1.18	0.23	92
Ramtil	37.6	6.66	17.00	6.38	169
Linseed	1.6	0.28	0.33	0.73	456
Other Oilseed	56.2	9.95	139.45	56.91	1012
Total Oilseed	126.3	22.36	4.17	101.71	805
Cotton	8.0	1.42	1.72	10.13	1266
Other Fibre	1.1	0.19	5.07	2.24	2036
Total Fibre	9.1	1.61	1.34	12.37	1359
Total Non-Food crops	135.4	23.97	3.01	114.08	842
Grand Total	564.9	100.00	2.49	657.66	1164

PRODUCTION (THOUSAND TONNES) OF DIFFERENT CROP GROUPS IN CHHINDWARA DISTRICT T. E. 1978 - 79 AND T. E. 1988-89

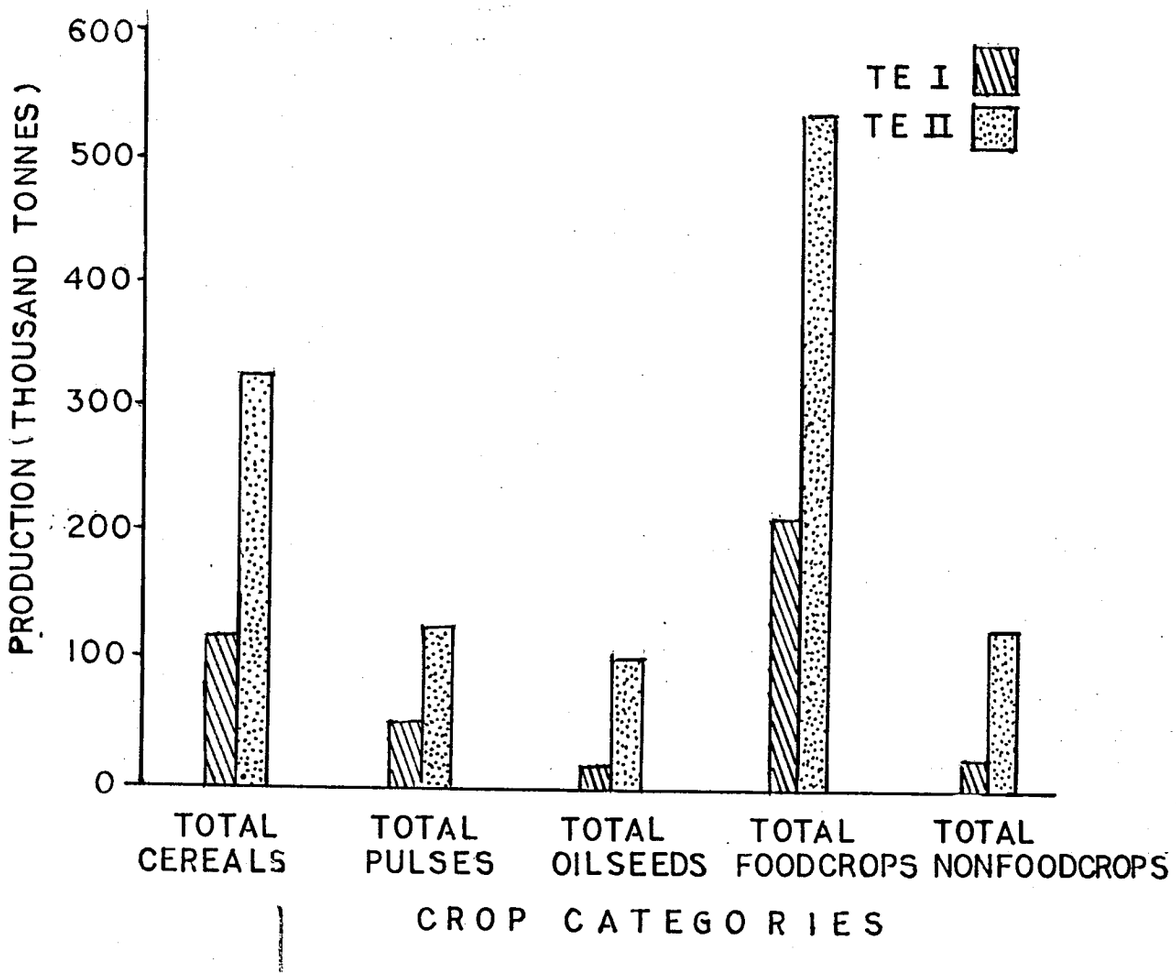


Fig.3

YIELD (Kg.PER ha.) OF IMPROTANT CROPS IN CHHINDWARA DISTRICT M.P.
T.E. 1978-79 & 1988-89

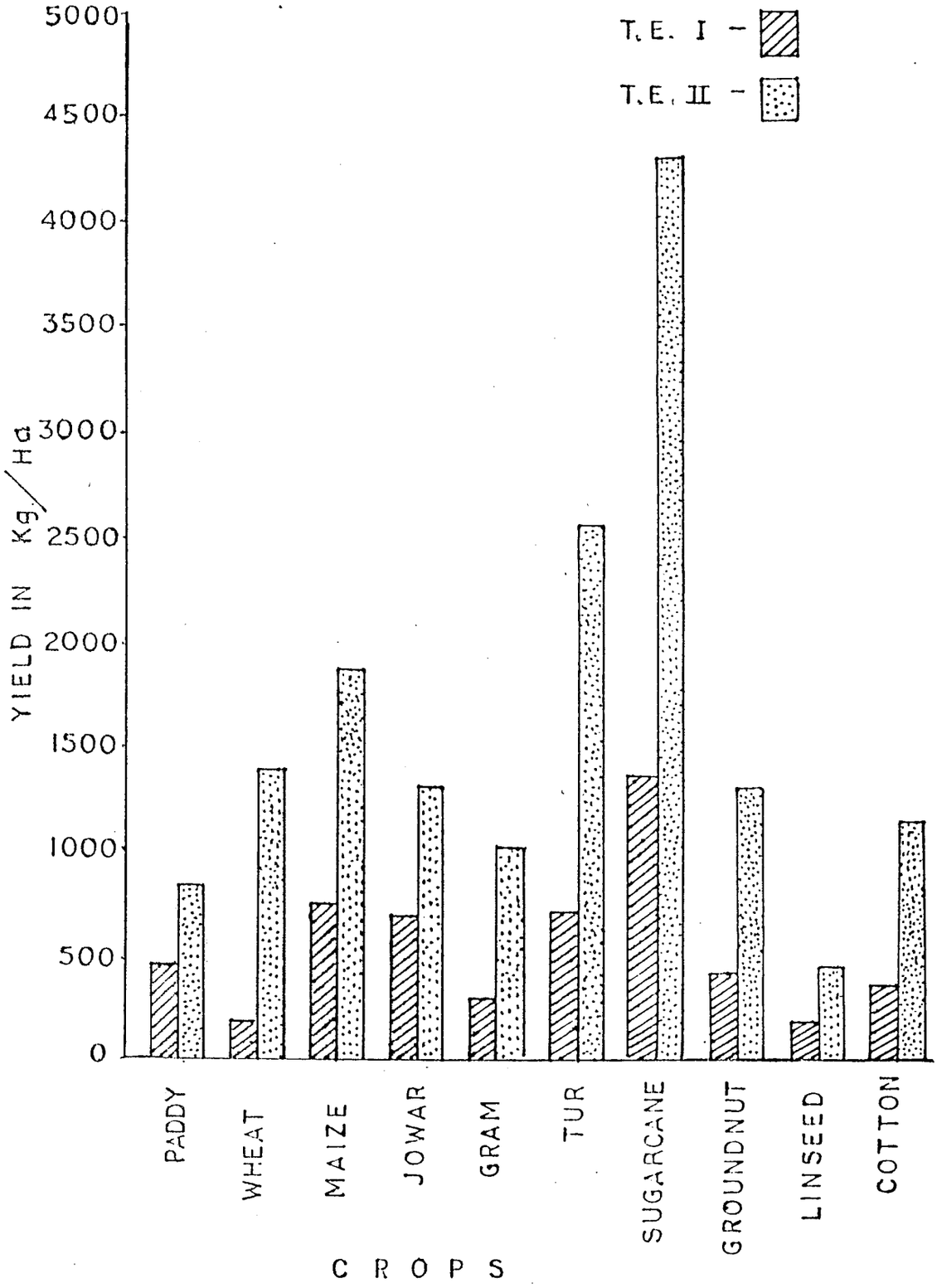


Fig.1

2.12 Farming Situation in Chhindwara District

2.12.1 The major portions of the district is inter woven with hills with step slopes, hillocks of medium to low height with in between patches of even land having 5 to 10%. Thus, there is absence of vast chunks of land worth name to be identified for there peculier situation. This changes every five hundred to five thousand (500-5000) meters, making possible to grow large number of crops. The rainfall distribution varies from low of 800 mm.in southern most part of district to high of 1600 mm. towards northern part of district. Availability of under ground water is poor. Irrigation is mostly through open wells followed by canals which commands only 11% area of the zone. The drainage system in the zone is provided by the rivers like Tawa and Sakkar which merges in Narmada in north. Pench and Kenhan rivers originate from eastern part of Chhindwara district and merges finally in Bainganga. The soils in general are low in nitrogen low to medium in phosphorous and medium to high in potash. Soil type, climatic parameters, socio-economic characters and prevelent cropping pattern have been used as critera for identification of farming situations. Development block has been considered as the unit for demarcating the boundaries.

2.12.2 Six farming situations have been identified based on the criteria described above which have been summarised as under (Table 2.27).

Table 2.37 Farming Situation Identified for Chhindwara District

S. No.	Farming situation	Soil/ Topography	Rainfall (mm)	Principal crops	Special features	Blocks
1.	Mono-Cropping high elevation rainfed	Light, Gravelly and slopy rolling topography	800-1600	Kodo-kutki, Niger, Maize Soybean, Paddy	Kodo-Kutki- fallow Niger- fallow Jowar- fallow Soybean- fallow Paddy- fallow Jowar+Arhar-fallow Maize+Cowpea/ Doliches- fallow	Jamai, Harrai, Tamia,
2.	Mono-Cropping Moderate elevation rainfed	Sandy loam to shallow black shallow modrate slope	1000-1200	Kodo-kutki Niger, Soybean, Maize, Jowar	Jowar- fallow Niger- fallow Kodo-Kutki- fallow Soybean- fallow Groundnut- fallow Paddy- fallow Maize+Urd(mixed) fallow Jowar+Arhar(Mixed) fallow	Chhindwara, Chourai, Mohkhed, Bichua, Amarwara, Parasia,
3.	Mono-cropping low elevation rainfed	Medium black soil	700-1000	Jowar, Groundnut, Soybean	Jowar - fallow Kodo - fallow Groundnut - fallow Jowar+Arhar(Mixed) fallow Maize+Urd (Mixed) fallow Jowar+Groundnut - fallow (intercrop)	Sasusar, Pandhurna
4.	Double cropping	Medium to shallow black	1000-1200	Wheat, Gram, Maize, moong, urd, Soybean	Barly Maize- Gram/Wheat Soybean- Wheat/Gram (early) Urd/Moong-Wheat/Gram	Chhindwara, Chourai, Mohkhed, Bichua, Amarwara

Table 2.20 Continued.....

5. Double cropping under irrigation	Medium black soil	1000-1200	Soybean, Maize, etc.vegetable, moong, pea	Soybean + Wheat Maize + Wheat Moong+ Vegetable	Almost all the blocks of district except Tamia, Harrai
6. Fruit Culture	Medium black soils	800-1000	Orange, Mango, Oranges, Santra'	Inter cropping of moong, soybean, Groundnut, Cotton in orange orchards, Mango orchards in early stage	Sausar and Pandhurna
7. Special multiple cropping situation vegetable (irrigation)	Sandy loam to clay, loam drainage good	800-1000	Potato, Cauliflower, Cabbage Tomato, Brinjal, Chhillies, Onion, Garlic, Ginger, Beans	Cowpea-Potato-Cucurbit beans-Potato-cucurbit Brinjal-Onion/Garlic-Beans Chearbils Onion-Chhilli, Tomato-Cabbage/ Caulflower- Beams	Chhindwara and Mohkhed
8. Cash crop farming situation (cotton-Sugarcane)	Light to medium black Cotton soil	800-1000 1000-1200	Cotton Sugarcane	Cotton Sugarcane inter cropped with moong	Sausar, Pandhurna, Bichua Chhindwara & Amarwara

2.12.3 Summary of Farming situations, (Agro-ecological situation in Chhindwara district)

Situation No.1

Mono-Cropping	:	High elevation-Rainfed soil, Type-Gravelly, Slopy, (20-30%) Rolling topography, very poor erroded slatted soil depth up to 15 cm.
Elevation	:	700-1100 M. above MSL
Rainfall	:	800-1600 mm.
Blocks	:	Part Jamai, part Harrai, Tamia, Parasia, and multai.
Crop sequence	:	(1) Kodo/Kutki - fallow (2) Niger - fallow

Situation No.2

Mono-Cropping	:	Moderate elevation-rainfed:
Soil type	:	Sandy loam to shallow black soils, moderate slope 5 to 10% soil depth 20-40 cm. Soil fertility variable- poor to moderate.
Elevation	:	400-800 M. above MSL
Rainfall	:	1000-1200 mm.
Blocks	:	Chhindwara, Chourai, Mohkhed, Bichua, Amarwada, Parasia
Crop sequence	:	1) Jowar - fallow 2) Niger - fallow 3) Kodo/Kutki - fallow 4) Soybean - fallow 5) Groundnut - fallow 6) Paddy - fallow 7) Maize+Urad (mixed) - fallow 8) Jowar+ Arhar (mixed) - fallow

Situation No.3

Mono-Cropping	:	Low elevation rainfed
Soil type	:	Black-clayey loam, medium black soil, soil depth above 50 cm. heavy textured, low in fertility.
Elevation	:	400-600 M above MSL
Rainfall	:	700-1000 mm.
Blocks	:	Sausar, Pandhurna

Crop sequence	:	1)	Jowar	- fallow
		2)	Groundnut	- fallow
		3)	Soybean	- fallow
		4)	Jowar + Arhar (mixed)	- fallow
		5)	Jowar + Groundnut (intercrop)	- fallow
		6)	Maize + Urad (mixed)	- fallow

Situation No.4 :

Double cropping - Rainfed

Soil type : Shallow black to medium soil depth 25-50 cm. moderate fertility.

Elevation : 500-800 M. above MSL

Rainfall : 1000-1200 mm.

Blocks : Chhindwara, Chourai, Mohkhed, Bichua, Amarwara

Crop sequence	:	1)	Early Maize	- Gram
		2)	Early Soybean	- Gram
		3)	Urd/Moong	- Gram
		4)	Soybean	- Wheat

Situation No.5

Double cropping - Under irrigation

Soil type : Medium black, Moderate textured, moderate fertility.

Elevation : 500-800 M above MSL

Rainfall : 1000-1200 mm.

Irrigation : Mostly through open wells canals, and tube wells.

Blocks : Almost in all the block of the district except Tamia and Harrai.

Crop sequence	:	1)	Soybean	- Wheat (Maxican)
		2)	Maize Hybrid	- Wheat (Maxican)
		3)	Moong	- Vegetables
		4)	Pea (Table)	- Wheat (late sown)
		5)	Cotton	- Wheat
		6)	Groundnut	- Wheat

Contd.....

Specific farming

Situation No.6 :

6A Vegetables : (4000 ha)

Soil type : Sandy loam, well drained moderate fertility

Elevation : 600-800M. above MSL.

Rainfall : 900-1000 mm.

Irrigation : Mostly through open wells

Blocks : Chhindwara and Mohkhed

Crop sequence :
1) Tomato-Potato- Brinjal
2) Tomato-Cauliflower-Cucarbits
3) Beans-Potato-Cauliflower
4) Brinjal-Onion/Garlec-Cowpea
5) Tomato-Cabbage-pumpkin
6) Soybean-Potato-Green chillies
7) Ginger-Ginger-Beans
8) Okara-Peas-Okara
9) Cauliflower-Cauliflower-Leafy vegetable
10) Cabbage-Cabbage-Cabbage

6-B Oranges : (5000 ha)

Soil type : Medium black calcarious nature, good water retentivity. well drawed

Elevation : 500-600 M above MSL.

Rainfall : 700-900 mm.

Blocks : Sausar, Pandhurna and Bichua

Crop Sequence :
1) Nagpur Santra all the year rourd and after 7 years of age.
2) Nagpur Santra intercropped with cotton
3) Nagpur Santra Intercropped with Grountnut
4) Nagpur Santra Intercropped with Soybean/gram.
5) Nagpur Santra intercropped with chillies/cauliflower.

6-C Fibre Crops : Cotton (8000 ha) Rainfed.

Soil type : Black cotton soil, good water retentivity

Elevation : 500-600 M. above MSL.

Rainfall : 600-800 mm.

Blocks : Sausar, Pandhurna, Bichua

Crop sequence	:	1) Cotton (sole) - fallow 2) Cotton+Tur(intercrop)-fallow 3) Cotton+ groundnut
6-D Sugarcane	:	(11000 ha.)
Soil type	:	Medium soil good fertility, good water holding capacity.
Elevation	:	500-800 M above MSL
Rainfall	:	1000-1200 MM.
Irrigation	:	Through open wells
Blocks	:	Chhindwara, Amarwara, Mohkhed, Bichua, and Chourai
Crop sequence	:	1) Sugarcane - Sugarcane

CONSTRAINTS IN DIFFERENT FARMING SITUATIONS

Farming situation		Constraints
1. Situation No.1	:	1. To develop technology for soil & water in of conservation in highly slopy land kodo/kutki. 2. Soils are low in nutrient content. 3. Lack of improved agricultural implements. 4. Use of traditional seed testing of improved varities. 5. Poor adoption of improved package of practices 6. Market facilities is lacking.
2. Situation No.2	:	1. Improved seed of Jowar and Maize not available Testing of high value. 2. Wheat is sown by broadcast method with heavy seed rate. 3. Low level of NPK is used in J & M. 4. Gram and Arhar suffers from wilt. 5. Certified seed of different crops is not available.

3. Situation No.3 :
   1. Deshi Jowar and Maize is traditionally grown there are improved technology.
   2. Local seed of wheat/gram/and Arhar are still grown.

4. Situation No.4 :
   1. Farmer do not apply recommended dose of NPK to wheat and hence yields are low.
   2. For quick harvesting of large acreage of Soybean no harvest technology is available.

5. Situation No.5 :
   1. Balance dose of fertilizer not adopted in both the crops.
   2. Lack of improved seeds.

6. Situation No.6

   6-A :
   1. Problem of bacteroal wilt in vegetables.
   2. Disease free seed stock of potato not available
   3. As per season at need Cauliflower seed is not available as required.
   4. Ginger soft rot is a problem.
   5. Short duration varieties of sweet potato is not available.

   6-B :
   1. Non availability of pedgree trees.
   2. Problem of gumosis die-cack, quick decline and 'KOLSI'
   3. Improved crop production technique is not available.

   6-C :
   1. Seed of JKH-1 is in short supply.
   2. Long duration varieties suffer from wilting at later stage of crop growth.

   6-D :
   1. Replacement of existing seed stock is required with high yielding ones.
   2. Red rot of Sugar come is a severe problem causes yield deteoration.

Contd.....

RESEARCH NEED

1. Situation-1 :
   1. Agriculture based farming system needs to be worked out.
   2. To improve status of the poor farmers promotion of dairy, goat-keeping, poultry, beekeeping sericulture, sirithy carpentory industries be encourage.
2. Situation-2 :
   1. Wilt resistant variety of Arhar and Gram is prime need.
   2. Powdery mildew resistant variety of Urd is desired.
   3. Certified seed of all crops may be made available.
   4. Poor plant pop in Niger is due to B.C. hence yield are low.
3. Situation-3 :
   1. Same as situation No.2
4. Situation-4 :
   1. Certified seed of high yielding cultivars is to be made available.
   2. To bring more acreage under double cropping rainfed with appropriate rotations.
5. Situation-5 :
   1. Line sowing in Wheat (Irrigated) not adopted over broad casting in seed bed.
   2. 50-100% higher seed rate is used.
   3. Low doses of NPK are used.
   4. Balance dose of fertilizer and other package of practices need to be adopted.
6. Situation-6 :

   6-A
   1. Seed farm for potato with full irrigation is required.
   2. Churda-Murda resistant variety is required.
   3. Resistant variety of soft root of Ginger is required.

   6-B :
   1. Disease free varietial replacement is immediately needed.

   6-C :
   1. Short duration hybrid variety over JKH-1 is required to prevent losses from moisture stress at the later stages.
   2. Seed of JKH-1 is to be made available.

   6-D :
   1. Seed of high yielding variety is needed.
   2. Disease free seed (Red root) may be replaced with susceptible one.

2.13 Horticulture and Farm Forestry

2.13.1 Horticulture plays an effective role in improving the standard of living of the poor section of the society by generating more income per unit area and creating employment opportunities in the rural areas.

2.13.2 The Chhindwara district is endowed with varied agro-climatic conditions for production of a variety of fruits and vegetables. The Horticulture Division was formed to look after the development of horticulture in the district with the help of the State Directorate of Horticulture.

2.13.3 The administrative set up in the district was headed by the Assistant Director. He was assisted by 10 Senior Horticultural Development Officers in the development block. There was 49 Rural Horticultural Development Officers in the blocks. In addition, there are 43 parts of mali (gardeners).

2.13.4 For the year 1991-92 following programme were proposed.

(i) National Bank for Agriculture and Rural Development (NABARD) Loans for Orchard

(ii) Orange Plantation Scheme (Departmental) subsidy 25%

(iii) Papaya Plantation (own expenses), bank loan

(iv) Top working Programme (Departmental & Trainees)

(v) Training Programme for Top Workers

(vi) Anganwadi Programme (Fruits Plants distribution free of cost)

(vii) Distribution of Fruit Plants free of cost around Tube-wells or wells.

(viii) Area extension of spices Crops: 1. Chillies, 2. Termeric, 3. Ginger, 4. Garlic, 5.Coriender, 6. Others.

(ix) Vegetable Minikit Demonstration Programme (Central Govern)

(x) Spices Development Programme- Ginger Demonstration.

(xi) Integrated spices development Programme (Coriender Minikit demonstration)

(xii) Potato development scheme- Potato demonstration.

(xiii) Vegetable development scheme- Area extension of vegetable crops, 1. Potato, 2. Sweet Potato, 3. Onion, others: Redish, Carrot, cucarbit.

(xiv) Area extension extra Programme

(xv) Ornamental (Flower) development Programme

2.13.5 The climatic condition in the district are suitable for growing of a large variety of citrus crops. At present two schemes are being implemented by the ICAR and NARP at Kuddan Farm in the district for development of Citrus crop. Major citrus producing area in the district are Sausar and Pandurana blocks and this crop covers 4854 hectares in Chhindwara district and 8973 hectares in the State. It would also generate employment opportunities in times when agriculture provides reduced job opportunities. Constraints like gradual soil stress due to low water level, improper use of fertiliser and bad management of orchard and infestation due to different insects and diseases etc.are responsible for the gap between the potential and the achievement in this sector.

2.13.6 Progress of various schemes of Horticulture and Farm Forestry, based on data 1991-92, relating to the Chhindwara district is given below :

Table 2.27 Progress of various schemes of Horticulture and Farm Forestry, in Chhindwara District(1991-92)

Scheme/Programme	Target	Achievement	Scheme/Programme	Target	Achievement
Under Action Plan (Hectares)					
1. Departmental	770.00	1286.200	Top working		
2. Under Bank Finance	230.00	100.00	Scheme (No of plants)		
3. Community Horticulture	Nil	Nil	1. Sub plan		
Other than Action Plan(Hectares)	30.00	20.000	(a)Departmental Trainees	4000	7443
			(b)Departmental Gardeners	2200	2439
Papaya Development (Hectares)			2. Plan		
1. Papaya Plantation	75.00	51.660	(a)Departmental Trainees	Nil	Nil
2. Distribution of Seedings(No.)		129150	(b)Departmental Gardeners	Nil	Nil
Free distribution of Fruit plants for areas adjacent to wells and kitchen Garden (no.of plants)			Horticultural Development		
			(a) Near big cities (Area- Hectares)	200	
1. Near Irrigation Wells	4500	4510			
2. Under Sub Plan	2000	2000	(b) Near Industrial Areas (Area- Hectares)		
3. For Kitchen Garden (No.of packet)	2105	950			
a) Under general plan			(c) Intensive Cultivation of Spices Minikits of Coriender demonstration	145	145
b) Under Sub-Plan			Sprayer (D.O.E.)	20	-
Potato demonstration Kharif	200	200			
Unit- No.of Demonstration Rabi	100	100			
Production of Plants(No.)					
a) Grafted	80500	12302			
b) Seedings	176000	98313			
Distribution of Plants (No.)					
a) Grafted	5883	5883			
b) Seedlings	33825	36408			

Contd....

Table 2.28 continued....

Scheme/Programme	Target	Achievement	Scheme/Programme	Target	Achievement
Kharif 91-92 Improved seed Distribution (unit in Kg.)					
1. Okara	750	410.75			
2. Bitter gourd	120	50.00			
3. Bottle gourd	125	5.00			
4. Ridge gourd	75	-			
5. Pump kin	-	1.00			
6. Brinjal	12.5	0.65+			
7. Tomato	12.5	10.00			
8. Cow Pea	400	4.25			
9. Maithi	25	25			
10. Coriender	20	20			
11. Chillies	24	24			
12. Carrot	2	2			
13. Palak	2	7			
14. Onian	225	Nil			
15. Khira	45	Nil			
Rabi Season 91-92 Seed Distribution					
1. Pea	145	250			
2. Potato	-	100			
3. Okara	-	-			
4. Tomato	-	32.00+10			
5. Brinjal	-	0.500+22			
6. Chillies	-	20.00+1			
7. Palak	-	2.00			
8. Cow Pea	-	4.50			
9. Carrot	-	2.00			
10. Potato	-	100			
11. Bitter gourd	-	50.00			
12. Coriender	-	20.00			

2.13 Economic Characteristics

2.13.1 Size and ownership of Operational Holdings

There was 1,51,831 operational holdings covering 5,76,338 hectares in the district. Thus the average size of the holding was 3.79 hectares. The distribution of area was very unequal (Figure 5). More than half (57.8 per cent) of the total number of holdings commanded less than 3 hectares each and occupied only 19.3 per cent of the land whereas less than half (40.8 per cent) of the total number of holding commanding between 3 to 20 hectares each occupied 71.2 per cent of the land. (Table 2.29)

Table 2.29 Operational holdings and Area, Chhindwara district

Size group (hectares)	No.of Operational holdings		Area under operational holdings	
	No.	%	Area (Hectares)	%
Less than 0.5	23,397	15.4	4,184	0.7
0.5 to 1.00	13,975	9.2	10,462	1.8
1.00 to 2.00	28,252	18.6	42,097	7.3
2.00 to 3.00	22,223	14.6	54,597	9.5
3.00 to 4.00	14,931	9.8	51,516	8.9
4.00 to 5.00	11,837	7.8	52,522	9.1
5.00 to 10.00	25,676	16.9	1,78,036	31.1
10.00 to 20.00	9,539	6.3	1,27,233	22.1
20.00 to 30.00	1,505	1.0	35,395	6.2
30.00 to 40.00	314	0.2	10,633	1.8
40.00 to 50.00	103	0.1	4,479	0.8
50.00 and above	79	0.1	5,183	0.9
Total	1,55,831	100.0	5,76,338	100.0
Average size of holding			3.79	

NUMBER AND AREA OF OPERATIONAL HOLDINGS IN CHHINDWARA DISTRICT

(AGRIL. CENSUS -1981)

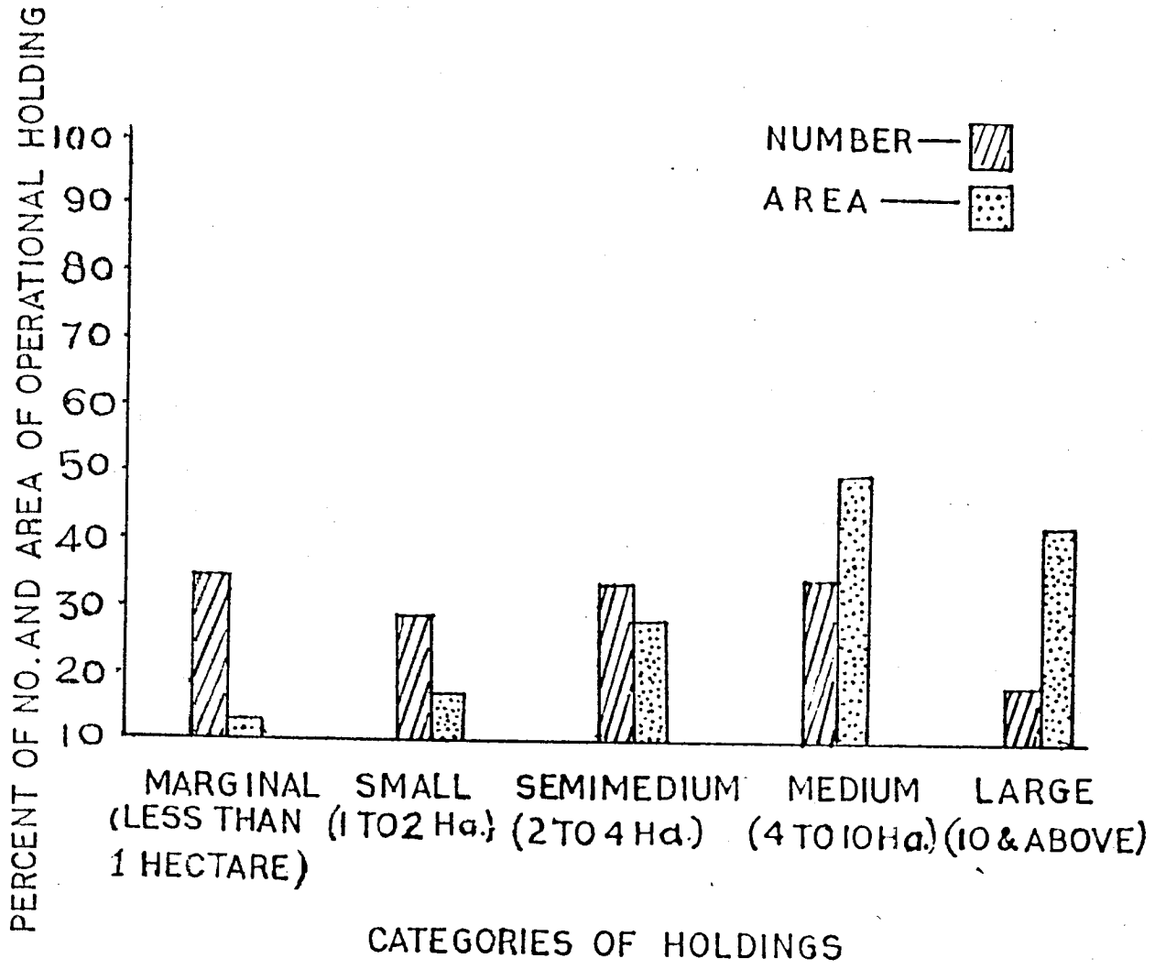


Fig.5

2.13.2 On the whole the distribution of area was very unequal. This is depicted by the Lorenz curve fitted to illustrate the concentration of number and area of operational holdings. (Figure 6)

2.13.3 Livestock

Despite the fact that wide grazing areas are available livestock economy could not develop in the district. The total number of livestock in the district was 14,35,355. If included cattle (51.88 per cent), goats (16.54 per cent) and buffaloes (9.52 per cent) Poultry birds also constituted significant (20.89) percentage in total livestock. (Table 2.39

Table 2.39 Live stock Population, Chhindwara district

Livestock	Number	Percentage to total
Cattle	7,44,709	51.88
Buffaloes	1,36,710	9.52
Goats	2,37,452	16.54
Sheep	2,156	0.15
Horses	6,422	0.45
Pigs	8,219	0.57
Poultry	2,99,887	20.89
Total	14,35,555	100.00

2.13.4 Livestock raising is frequently advocated for tribal farmers. However, dairying and cattle breeding enterprises almost always need more water for raising cultivated forage and maintenance of animals. In view of large scale water scarcity in the tribal area specially during summer these enterprises are simply

ruled out. Sheep breeding, on the other hand, appears more promissing. Sheeps are known to thrice on much wider grassing material and therefore, need to be patromised.

2.13.5 Ownership of Operational Holdings by Caste

Although scheduled castes constituted 10.01 per cent in the rural population their proportion in the number of holding and also area of operational holding was lower (7.89 per cent). On the other hand scheduled tribes had much higher proportion in number (37.47 per cent) and area of operational holdings (41.96 per cent) Other caste people had highest proportion in number (52.32 per cent) but their area of operational holding (50.15 per cent) was less. (Table 2.31)

2.13.6 Working Force

Among workers 'Cultivators' constituted the largest percentage (47.82 and 47.68) in both the census years. The next numerous group of workers was of 'Agricultural labourers' (30.56 and 29.27). It was observed that the proportion of agricultural labourers declined, whereas, that of other workers increased during the last decade. However, in cultivators there was no variation. (Table 2.32).

Table 2.32 Working Population in Chhindwara district

Particulars	1971		1981	
	Number	Percentage to total workers	Number	Percentage to total workers
Cultivators	1,78,599	47.82	2,33,600	47.68
Agricultural labourers	1,14,165	30.56	1,43,416	29.27
Household Industry (Manufacturing, Processing. Servicing and Repairs)	12,103	3.24	13,292	2.71
Other Workers	68,660	18.38	99,628	20.34
Total workers	3,73,527	100.00	4,89,936	100.00

LORENZ CURVE OF CONCENTRATION ON NUMBER AND AREA OF OPERATIONAL HOLDINGS IN CHHINDWARA DISTRICT (M.P.) 1981

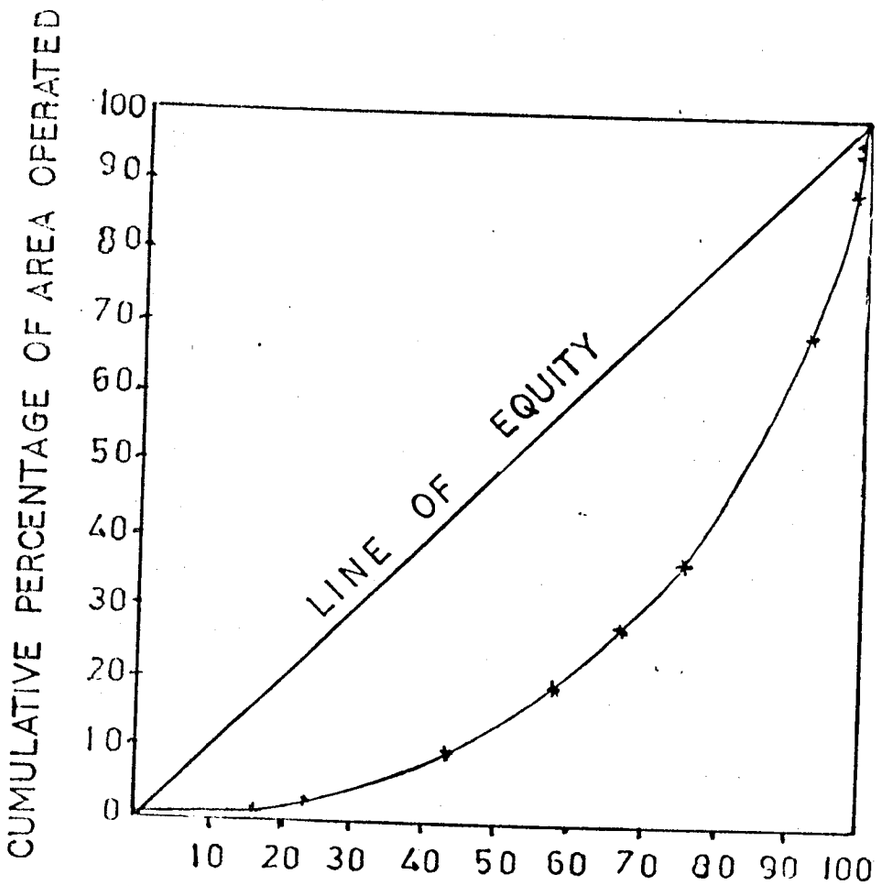
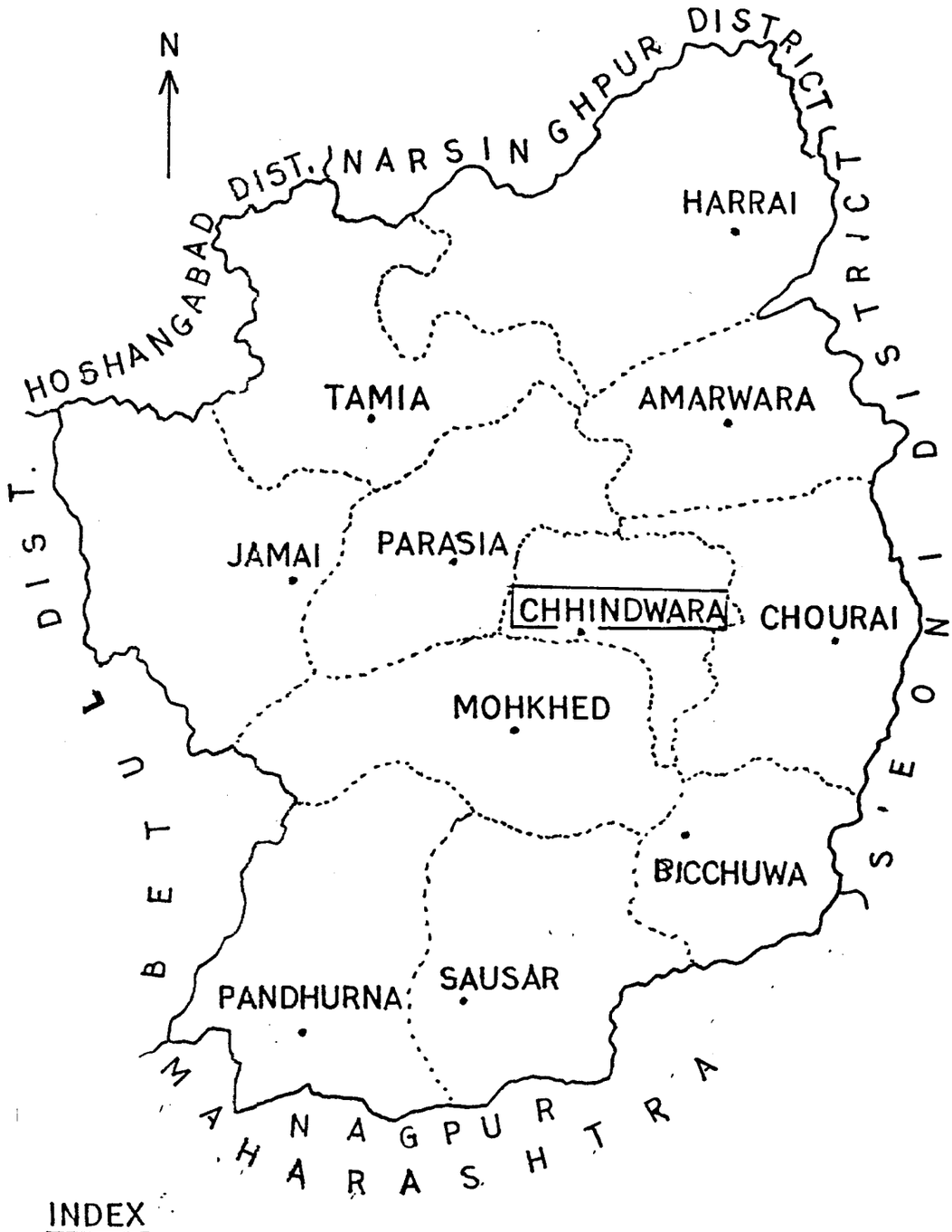


Fig.6

CHHINDWARA DISTRICT



CHAPTER 3

AGRO-CLIMATIC REGIONALISATION AND PROFILE OF SUB REGIONS

3.1 Agro-Climatic Regionalisation

3.1.1 Agriculture and climate are both inter linked. Climate more than any other single environmental factor determines the vegetation of a locality. It exerts primary influence on crop production and through the available food and water sources govern the distribution of livestock. Climatic factors dictate not only the primary crops of an area but also the types and association of trees and forests. It, indeed, is a complex variable. Variables like temperature, precipitation, humidity, wind velocity make baffling combinations. If some of these parameters are brought under strict laboratory conditions, their essential dynamics are lost, thereby affecting the farm output. Moreover, crop production largely depends upon the time sequence of atmospheric events which by their very nature suffer from tremendous variability. Agro-climatic regionalisation is, therefore, an important factor for regionalisation. It's importance also stems from the fact that agricultural developmental processes could be much more enhanced if such regionalisation practices are adhered to.

3.1.2 With the ever-increasing need for food, shelter, and energy the task of maximising agricultural output has become an important concern for the entire human race and is perhaps the first priority for an agricultural country like India. A proper knowledge of agro-climatic conditions is necessary to plan the most effective cropping pattern and supplemental irrigation for different zones. It is essential to evolve a precise methodology and strategy for optimum results in agricultural development.

3.1.3 Regionalisation has been of considerable importance for the development of Indian economy. Many regional planners, especially geographers, have put forth their ideas towards such directions. With the progress of technology and changes in the cultural landscape, the geographer's concept of the region and its attributes have found wider horizon to be applicable as "spatial dimensions" in the analysis of the structure of economy over a period of time. In the context of regional planning, it is, therefore, necessary to examine the regional concept so as to devise strategies most appropriate to a given situation and acceptable by different disciplines involved in studies on planning.

3.1.4 Basically, an agrarian based economy and regionalisation of agriculture in India is of utmost importance. The delineation of agricultural regions is done on the basis of all agricultural attributes. Another important factor, affecting Indian agriculture is climate. The future planning and planned development in India should be on the basis of agricultural climatic regions and sub-regions. It is a welcome and appropriate strategy in a country where agriculture is the mainstay of the people and where for centuries the monsoon holds the key to survival.

3.2 PROFILE OF SUB-REGIONS

Identification of sub-regions

3.2.1 The land topography of Chhindwara district is typical and quite different from rest of districts in Madhya Pradesh, being cludded with ranges of Satpura mountain, it is predominently slopy in nature with very small percentage of area under level lands. The slope ranges from 1-2% to as 80% and above. The soils of the district ranges from sandy to clayay. Mostly three ty of soils are found in the district.

1. Light raddish brown upland soils.
2. Yellow and silty loam soils.
3. Shallow black or Clayay loam soils.

3.2.2 On the basis of these soils the district was divided into following three sub-regions.

1. High ranges of Satpura
2. Plateau of Satpura
3. Plains of Satpura

3.3 High ranges of Satpura

3.3.1 This situation is characterised by high mountains of Satpura with an elevetion ranging from 200 to 1000 metres above mean sea level. Rainfall in this situation varies from 1200 to 1400 mm. This is predominantly mono Kharif area. Most of the area in this category is sloppy and undulating with a slop gradient ranging upto 80 per cent. Nearly 27 per cent of the cultivated area of this region falls in this situation. The important crops grown in this region are Kodo-Kutki followed by niger. This situation extends in north eastern region of Chhindwara district. It includes three blocks of Chhindwara.

District	Block
Chhindwara	1. Junnardeo
	2. Tamia
	3. Harrai

3.3.2 The soils are skeletal, gravelly, surrounded by dense reserve forests. Under this situation, cultivation of crops is practically negligible, because of sloppy hills with high slope gradient. About 45 per cent of cultivated land of this situation have small hillocks with moderate slope and rolling topography.

This land is being utilized to grow 50 per cent of the total hectarage of kodo-kutki and niger in Satpura Plateau.

3.4 Plateau of Satpura

3.4.1 This agro-ecological situation is the largest in area having moderate stop embadded with hillocks and rocks. The elevation of this location is 400-800 meters above mean sea level. Soils are shallow black, loamy clay, red loam and loamy. The soil depth varies from 25 cm. to 50 cm. with medium retentivity of moisture and low fertility this agro-ecological situation has about 12% of its area irrigated mainly through wells in district. Rainfall of this sub region is 1000-1200 mm. per year.

3.4.2 Soils of this situation are shallow black, loamy clay and red loam. Jowar and wheat are the main crops followed by arhar, urid, niger, maize, gram, soybean and vegetables.

3.4.3 The Plateau of Satpura consists of the following six blocks of the district.

District	Blocks
Chhindwara	1. Amarwara
	2. Chourai
	3. Bichua
	4. Mohkhed
	5. Chhindwara
	6. Parasia

3.5 Plains of Plateau

3.5.1 The topography of this sub-region is predominantly plain with scattered small hillocks. Soils of this sub-region are black and clayay loam, ill drained, heavy textured and low in fertility, but are of high yield potential if properly managed. These soils

have high retentivity of water. In this sub-region irrigation is very limited, mostly through wells and utilized in orchards and wheat fields. Rainfall varies from 800-1000 mm.

3.5.2 Jowar is the main crop of this sub region followed by kodo-kutki, wheat, soybean, arhar, groundnut, gram and maize. This sub-region also grows two special crops i.e. cotton and oranges though small in acreage but intensive in their cultivation. These two crops are agricultural labour employment oriented to a limited extent.

3.5.3 This sub-region includes two blocks of southern Chhindwara which are as below.

District	Blocks
Chhindwara	1. Sausar
	2. Pandhurna

3.6 Sub-Regionalisation

3.6.1 Based on physical conditions, topography, rainfall, soil types, cropping pattern, development of irrigation the Chhindwara district is divided into three sub-regions. A sub-region comprised of a number of Development Blocks. (Table 3.1)

Table 3.1 Distribution of blocks in the sub-regions of Chhindwara district.

Sub-regions	Blocks included	Tahsil
I. High ranges of Satpura	i) Junnardeo	Junnardeo
	ii) Tamia	Tamia
	iii) Harrai	Amarwara
II. Plateau of Satpura	i) Amarwara	Amarwara
	ii) Chourai	Amarwara
	iii) Bichhua	Sausar
	iv) Mohkhed	Chhindwara
	v) Chhindwara	Chhindwara
	vi) Parasia	Parasia
III. Plains of Satpura	i) Sausar	Sausar
	ii) Pandhurna	Pandhurna

3.7 Agro-climatic Features of Sub-Regions

3.7.1 Rainfall distribution : The stable rainfall period in these three sub region starts from 24th standard week and ends by middle or end of September (34th standard week). July and August are the month of heaviest down pour (730.0 mm.). The average weekly rainfall during this period is 90.0 mm. per week.

Thereafter rainfall keeps on decreasing till rains stop in the month of October. The average rainfall is 1118.0 mm. with 54 rainy days. The average rainfall is least in the south plain but goes on increasing with the rising elevation as one goes north. Tamia which is at a high attitude, receives the highest rainfall of 1600.0 mm.

Annexures 3.1, 3.2 and 3.3 presents the annual precipitation in three sub-regions of the district.

3.7.2 Climate : South portion of the district have a hot climate while northern portions are on a higher elevation and have a cool climate. The temperature of Central portion is moderate. December and January are the coldest months of the year while April, May and June are the warmest.

3.7.3 Soils : The black soil of the district being well suited for wheat and gram. The best wheat tract of the plateau is its south-eastern portion. The north-eastern part of plateau is also black soil tract but it is cut up frequently by hills which are suitable for millets only. The South and western portion has yellow soils. The rest of western portion is suited for kharif crops mostly millets. The higher plateau in the north also grow kharif crop chiefly the kodo-kutki and Niger.

Soils are generally low in nitrogen low to medium in phosphorus and medium to high in potash. The soils of hilly tracts are almost eroded and are poor in water holding capacity. The shallow black soils in plains have better soil fertility as well as good water holding capacity. (Table 3.2)

Table 3.2 Soil characteristics and distribution according to Agro-ecological situations in sub regions of Chhindwara district.

Agro-Ecological Situations	General features of soil type	Blocks	Average Rainfall(mm.)
1. High ranges of Satpura	Skeletal, Gravelly, and moistured easily	Jamai Harrai Tamia	1200-1400
2. Plateau of Satpura	Shallow black, Loamy clay, Red loam and Loamy	Chhindwara, Chourai, Mohkhed Bichhua Amarwara Parasia	1000-1200
3. Plains of Plateau	Black, clayey loam with deep soils, Different to manage.	Sausar Pandhurna	Below 1000

3.8 Soil properties of the sub-regions

The soils of the sub-regions are shallow black, yellow and reddish-brown up land soils.

3.8.1 Light Reddish-brown upland soil (45%) (Bhata soils): Soil belongs to associated orders, Entisols Inceptisols and Alfisols. There is severe erosion which removes most of the top soils. These soils are hardly 5 to 20 cm. thick, below which lies a compact layer of iron concentrations. The soils are mostly gravelly and very light textured. Gravel and sand percentage may vary from 80%, silt 15% and clay 10%, dominated in illite and to some extent kaolinite.

The soils become soft when wet and very hard when dry. The soil retain 5.5cm. of water of which 2.15 cm. of water is available to plant which is a great limitation in the use of this soil. These soils are very low in nutrient content and thus very low in fertility.

3.8.2 Yellow soils and silty loam (41%) (Matari soils) : These soils belongs to associated orders alfisols and ultisols. These soils are generally silty loam containing about 45% silty, 40% sandy and 15% clay dominant in illite type. The soil depth varies from 25 cm. to 50 cm. The soil retains 17.35 cm of water in 150 cm. profile out of which 50% i.e. 8.67 cm. is available to plant. These soils are low in fertility.

3.8.3 Black or clayey loam (14%) (Dorsa soil) : These belongs to associated orders Alfisols, vertisols and Inceptisols. These are well drained soils with some what heavy texture. These soils are clayey loam, containing about 25% of sand 35% silt and 40% clay dominent in Monmorillonite and to some extent illite. These soils though low in fertility status, are high in yield potential if properly managed. Soil has medium retaintivity of water.

3.9 Soil Problems : There are about 25% of the area under light upland soils in Chhindwara which is mostly gravelly, light and of very poor in fertility. These soils are left fallow or mixed millets crops are taken. Improvement on proper utilization of these soils are very necessary.

3.10. Water availability periods : Due to vegaries of monsoon, the growing season varies year to year. The growing season in late on set of monsoon under recent normal years is given below.
(Table 3.3)

Table 3.3 Water availability period and duration of growing season in days.

Sub-Humid-I		Humid		Sub-Humid- II	
Period	Duration (days)	Period	Duration (days)	Period	Duration (days)
9th June to 22nd June	14	23rd June to 22nd Sept.	92	23rd Sept. to 12th Oct.	20
Total growing season = 14 + 92 + 20 = 126 days					

This information is useful for adjusting the crops and cropping pattern of the mono-kharif area of the sub-regions under varied rainfall and different crops grown.

3.11 Discription of the sub-regions

3.11.1 Size, Number of Villages and Population : Sub-region I was the largest in the size covering 45 per cent of the area of the district. The other two sub-regions each shared 37 per cent and 18 per cent. Further sub-region-II covered half (49.95 per cent) of the total number of villages. The other two sub-regions shared 34 per cent and 16 per cent. The rural population was also highest in sub-region-II (53.96 per cent) followed by sub-region-I (23.69 per cent) and sub-region III (22.35 per cent). The density of rural population varies from 60 to 140 sq.km. in the sub-region. It is evident from the table that there is no significant difference in the density of population across the sub-region II and III. (Table 3.4)

Table 3.4 Basic data of sub-regions, Chhindwara district

Sub region	Area (Sq.km.)		Village		Rural Population		Density of rural Population (No/Sq.Km)	Total Population	Percentage of educated population	Percentage of uneducated population	Number of cultivators
	Total	Percentage	Total	Percentage	Total	Percentage					
Sub Region I	4651.15	45.07	680	34.17	236913	23.69	51	2,71,655	19.98	80.02	33,901
Sub Region II	3837.83	37.20	994	49.95	539741	53.96	140	7,12,476	28.94	71.06	1,17,876
Sub Region III	1829.97	17.73	316	15.88	223538	22.35	122	2,49,000	35.31	64.69	43,453
Total	10318.95	100.00	1990	100.00	1000192	100.00	97	12,33,131	28.25	71.75	1,95,230

3.11.2 Land use pattern

Sub-region I had half (50 per cent) area under forest consequently the percentage of net area sown was lowest (26.81 per cent) in that sub-region. Sub-region II had the highest production of net area sown (67.31 per cent) followed by sub-region III (64.17 per cent). The proportion of fallow land was highest (7.72 per cent) in sub-region I followed by sub region II and III (6.73 and 3.85 per cent respectively) Sub-region II had a highest proportion of permanent pasture (6.18 per cent) and lowest proportion of cultivable wasteland (1.54 per cent)(Table 3.5).

In all the three sub-regions around 58 per cent of the total reporting area is culturable. However, area under cultivation is only around 56 per cent cultivable wasteland, fallow land etc.co[illegible] a sizeable area of about a per cent of the total reporting area.

3.11.3 Irrigation -

In sub-region II wells (93.10 per cent) commanded the largest percentage of irrigated area followed by sub-region II (88.08 per cent) and sub-region I (59.49 per cent). In sub-region II canals covered 33.91 per cent area. The main source of irrigation in all the three sub-regions are wells which irrigate 87.62 per cent of the total irrigated area. (Table 3.6)

Table 3.6 Sources of irrigation, sub regions, Chhindwara district

(Area in hectares)

Source	Sub-region I		Sub region II		Sub region III		Total	
	Area	Percen-tage	Area	Percen-tage	Area	Percen-tage	Area	Percen-tage
1.Canals	1,160.4	33.91	1,335.7	2.92	795.7	5.75	3,291.8	5.22
2.Tanks	9.4	0.27	620.0	1.35	-	-	629.4	1.00
3.Tube-wells	-	-	20.6	0.04	12.4	0.09	33.0	0.05
4.Wells	2,036.3	59.49	40,298.6	88.08	12,892.3	93.10	55227.2	87.62
5.Other Sources	216.7	6.33	3,484.3	7.61	146.7	1.06	3847.7	6.11
Total	3,422.8	100.00	45,759.2	100.00	13,847.1	100.00	63029.1	100.00

Table 3.5 Land use classification, sub regions, Chhindwara district

(Area in Hectares)

	Sub-region-I		Sub-region-II		Sub-region-III		Chhindwara	
	Area	%	Area	%	Area	%	Area	%
1. Forest	2,20,964.9	50.09	32,698.7	7.78	14,368.6	9.44	2,68,032.2	26.45
2. Land not available for cultivation	34,963.1	7.92	43,912.3	10.45	21,261.4	13.97	1,00,136.8	9.88
3. Other uncultivated land excluding fallow land	22,450.6	5.09	25,994.8	6.19	7,125.3	4.68	55,570.0	5.48
a) Permanent pasture and other grazing land	22,437.3	5.08	25,948.9	6.18	7,122.0	4.67	55,508.2	5.47
b) Land under misc. tree crops and groves.	13.03	0.01	45.9	0.01	3.3	0.01	62.8	0.01
4. Cultivable waste land	10,442.6	2.37	6,467.4	1.54	5,922.7	3.89	22,832.7	2.25
5. Fallow land	34,050.9	7.72	28,262.2	6.73	5,863.3	3.85	68,176.4	6.73
6. Net Area sown	1,18,297.9	26.81	2,82,761.6	67.31	97,676.7	64.17	4,98,735.3	49.21
7. Total Geographical Area	4,41,170.0	100.0	4,20,097.0	100.00	1,52,218.0	100.00	10,13,485.0	100.00

The distribution of number of irrigation sources showed that while canals and wells had highest concentration in sub-region-II (Table 3.7).

Table 3.7 Number of sources of irrigation, sub regions, Chhindwara district.

Sub region	Canals	Tube-wells	Wells	Tank	Other sources
I	10	-	3,638	5	9
II	16	3	39,058	23	10
III	7	3	13,624	-	4
Total	33	6	56,320	28	23

3.11.4 Cropping Pattern

Jowar, wheat, kodo-kutki, soybean, niger, maize, urad, tur, gram, groundnut and paddy were the important crops of the district in the order of area occupied by them. The order of importance varied between sub-regions.

In sub-region I kodo-kutki was the most important crop with 36.18 per cent of the cropped area followed by maize (11.68 per cent) and wheat (10.74 per cent). Paddy occupied 5.64 per cent, jowar 5.40 per cent and urad 5.39 per cent. Niger was the main oilseed (8.37 per cent) followed by sesamum (1.41 per cent). Area under soybean crop was 1.30 per cent.

Thus kodo-kutki, maize, wheat and niger had special significance in this sub-region. Fruits and vegetable cultivation was also undertaken in the area i.e. 0.29 per cent.

In sub-region II wheat (17.74 per cent) and soybean (13.39 per cent predominated. Jowar occupied third place (11.30 per cent).

Niger (8.08 per cent), Kodo-kutki (6.82 per cent), maize (6.72 per cent) and urad (6.48 per cent) were the crops of special importance to this sub-region.

Sub-region III has the highest percentage of area under jowar (31.53 per cent) and groundnut (15.90 per cent) among all the sub-regions. Tur was third in importance (9.30 per cent). Among other crops soybean (8.47 per cent), wheat (5.09 per cent), urad (4.78 per cent) and gram (3.61 per cent) were important. Fruit and vegetable cultivation (4.88 per cent) was also undertaken on a large scale in this sub-region as compared to sub-region-I and II. (Table 3.8)

The distribution of cropped area by kharif and rabi seasons indicated that sub-region III had the dominance of kharif crops (85.62 per cent) over rabi crops (14.38 per cent), the kharif crops being jowar and tur.

Rabi crops had supermacy (29.02 per cent) in sub-region II over sub-region I and III (17.88 per cent and 14.38 per cent respectively). (Table 3.9).

Table 3.9 Area under kharif and Rabi crops, sub regions, Chhindwara district

(Area in hectares)

Season	Sub-region-I		Sub- region II		Sub- region-III		Total	
	Area	Percen-tage	Area	Percen-tage	Area	Percen-tage	Area	Percen-tage
Kharif	98811.3	82.12	239878.7	70.98	89763.6	85.62	428453.6	76.05
Rabi	21501.4	17.88	98064.2	29.02	15082.8	14.38	134648.4	23.95
Total	120312.7	100.00	337942.9	100.00	104846.4	100.00	563102.0	100.00

Table 3.8 Crop pattern, sub-regions of Chhindwara district

(Area in hectares)

Crop	Sub-region-I		Sub-region-II		Sub-region- III		Total I + II + III	
	Area	% to total	Area	% to total	Area	% to total	Area	% to total
Paddy	6807.3	5.66	16861.7	4.99	1770.6	1.69	25439.6	4.52
Wheat	12924.4	10.74	59969.6	17.74	5339.7	5.09	78233.7	13.88
Jowar	6492.7	5.40	39894.6	11.80	33077.0	31.55	79464.3	14.10
Maize	14050.0	11.68	22701.0	6.72	631.4	0.60	37382.4	6.64
Kodo-Kutki	43534.3	36.18	23038.7	6.82	1629.3	1.55	68202.3	12.11
Other Cereals	4461.8	3.70	4331.0	1.28	212.2	0.20	9005.0	1.60
Total Cereals	88270.5	73.36	166796.6	49.35	42660.2	40.68	297727.3	52.85
Gram	6782.5	5.64	16884.1	5.00	3785.9	3.61	27452.5	4.87
Tur	2539.9	2.11	17871.1	5.29	9749.9	9.30	30160.9	5.36
Urad	6482.5	5.39	21885.1	6.48	5012.6	4.78	33380.2	5.92
Pea	322.9	0.27	2006.9	0.59	53.0	0.05	2382.8	0.42
Lentil	255.8	0.21	1478.2	.44	11.6	0.01	1745.6	0.31
Other Pulses	642.2	0.53	9676.0	.86	3336.9	3.18	13655.1	2.42
Total Pulses	17025.8	14.15	69801.4	20.66	21949.9	20.93	108777.1	19.30
Total Food grains	105296.3	87.51	236598.0	70.01	64610.1	61.61	406504.4	72.15
Sesamum	1693.7	1.41	380.7	0.11	426.7	0.41	2501.1	0.44
Soybean	1563.7	1.30	45238.8	13.39	8880.3	8.47	55682.8	9.88
Niger	10072.0	8.37	27299.0	8.08	203.0	0.19	37574.0	6.67
Groundnut	344.4	0.29	9376.4	2.77	16675.7	15.90	26396.5	4.69
Linseed	233.6	0.19	1297.0	0.38	27.0	0.03	1557.6	0.28
Rape & Mustard	336.0	0.28	68.3	0.02	3.7	-	408.0	0.07
Other Oilseed	12.6	0.01	34.3	0.01	22.6	0.02	69.5	0.01
Total Oilseed	14256.0	11.85	83694.5	24.76	26239.0	25.02	124189.5	22.04
Sugarcane	146.6	0.12	8161.8	2.41	88.6	0.08	8397.0	1.49
Total Fibres	103.4	0.09	844.3	0.26	8157.0	7.79	9104.7	1.62
Total Drugs & Narcotics	-	-	-	-	0.7	-	0.7	-
Fodder	23.4	0.02	480.3	0.14	1.0	-	504.7	0.09
Total Fruits & Vegetables	346.4	0.29	5810.0	1.72	5112.6	4.88	11269.0	2.00
Total spices	140.6	0.12	2354.0	0.70	637.4	0.62	3132.0	0.56
Total Food Crops	105929.9	88.04	252923.8	74.84	70448.7	67.19	429302.4	76.20
Total non-food crops	14382.8	11.96	85019.1	25.16	34397.7	32.81	133799.6	23.80
Gross Cropped Area	120312.7	100.00	337942.9	100.00	104846.4	100.00	563102.0	100.00

3.11.5 Cropping Intensity

As the scope for bringing more area under cultivation was practically exhausted, some efforts were made to intensify land use through double cropping. Between three sub-regions cropping intensity showed an increase from 101.70 per cent in sub-region I to 107.34 per cent in sub-region III and moved up (119.51 per cent) in sub-region II due to an increase in gross cropped area. (Table 4.10)

Table 3.10 Intensity of cropping sub- regions, Chhindwara district, T.E.II 88-89

(Average in hectares)

Sub regions	Net area sown	Gross cropped area	Intensity of Cropping
I	118297.9	120312.7	101.70
II	282761.6	337942.9	119.51
III	97676.7	104846.4	107.34
Total	498736.2	563102.0	112.90

3.11.6 Irrigated crops

In sub-region I wheat occupied 86.56 per cent of the irrigated cropped area. Fruits and vegetables occupied 4.49 per cent while three-fourth of the area of fruits and vegetables was irrigated. Wheat was irrigated to the extent of about 45 per cent (44.96).

In sub-region II the only crop of wheat had a 59.73 per cent of irrigated area.

In sub-region III the extent of irrigation was lowest for wheat (29.6 per cent) among the three sub-regions. Fruits and vegetables were irrigated to the extent of 40.0 per cent.(Table 4.11)

Table 3.11 Irrigated cropped area and extent of irrigation sub-regions, Chhindwara district

('000 hectares)

Crops	Sub- region I				Sub- region - II			
	Irrigated area	Percentage to total	Cropped area	Percentage of irrigated area to cropped area	Irrigated area	Percentage to total	Crppped area	Percentage of irrigated area to cropped area
Paddy	-	-	6.8	-	-	-	16.9	-
Wheat	5.8	86.56	12.9	44.96	26.7	59.73	60.0	44.49
Maize	-	-	14.0	-	-	-	22.7	-
Jowar	-	-	6.5	-	0.04	0.09	39.9	0.10
Kodo-Kutki	-	-	43.5	-	-	-	23.0	-
Other Cereals	-	-	1.9	-	0.04	0.01	2.4	0.16
Total Cereals	5.8	86.56	85.8	44.96	26.8	59.9	164.8	16.26
Gram	0.3	4.47	6.8	4.4	2.5	5.6	16.9	14.79
Moong-Moth	0.02	0.29	0.2	10.0	0.02	0.04	7.6	0.24
Tur	-	-	2.5	-	-	-	17.9	-
Pea	0.05	0.75	0.3	16.7	1.0	2.2	2.0	50.0
Masoor	0.01	0.14	0.3	3.3	0.1	0.2	1.5	6.66
Urad	-	-	6.5	-	-	-	21.9	-
Barbati (Popet)	-	-	0.3	-	0.02	0.01	0.5	4.0
Other pulses	-	-	0.03	-	-	-	0.02	-
Total pulses	0.4	5.97	16.9	2.36	3.6	8.05	68.3	5.27
Total foodgrain	6.2	92.53	102.7	6.03	30.4	68.00	233.1	13.04
Sugarcane	0.1	1.49	0.2	50.00	8.2	18.34	8.2	99.99
Total fruits &Vegetables	0.3	4.47	0.4	75.00	4.2	9.39	5.8	72.41
Total Condiments& Spices	0.1	1.49	0.1	100.00	1.9	4.25	2.3	82.60
Total food crops	6.7	99.99	103.4	6.47	44.7	99.99	249.4	17.92
Groundnut	-	-	0.3	-	-	-	8.6	-
Sesamum	-	-	1.7	-	-	-	0.4	-
Soybean	0.002	0.02	1.6	0.12	-	-	45.2	-
Linseed	-	-	0.01	-	0.02	0.04	1.0	2.0
Mustard	-	-	-	-	0.02	0.04	0.4	5.0
Ramtil	-	-	10.1	-	-	-	27.3	-
Other Oilseeds	-	-	0.2	-	-	-	0.3	-
Total Oilseeds	0.002	0.02	13.9	0.01	0.04	0.08	82.8	0.04
Fodder	-	-	0.1	-	0.001	0.002	1.1	0.09
Total Non-food crop	0.002	0.02	14.0	0.01	0.041	0.002	83.9	0.04
Total cropped area	6.7	100.00	117.4	5.7	44.7	100.00	333.3	13.41

Table 3.11 Continued.....

Crops	Region-III				Total			
	Irrigated area	Percentage to total	Cropped area	Percentage of irrigated area to croped area	Irrigated area	Percentage to total	Cropped area	Percentage of irrigated area to cropped area
Paddy	0.004	0.03	1.8	0.22	0.004	-	25.5	0.01
Wheat	3.7	29.6	5.3	69.81	36.2	56.65	78.2	46.29
Maize	-	-	0.6	-	-	-	37.3	-
Jowar	0.004	0.03	33.1	0.01	0.04	0.06	79.5	0.05
Kodo-kutki	-	-	1.6	-	-	-	68.1	-
Other Cereals	-	-	0.2	-	0.004	0.01	4.5	0.08
Total Cereals	3.7	29.6	42.6	8.68	36.3	56.8	293.2	12.38
Gram	2.9	2.32	3.8	76.31	5.7	8.9	27.5	20.72
Moong-Moth	0.005	0.04	1.9	0.26	0.04	0.06	9.7	0.41
Tur	-	-	9.7	-	-	-	30.1	-
Pea	0.04	0.32	0.05	80.0	1.1	1.72	2.35	46.80
Masoor	0.007	0.06	0.01	70.0	0.1	0.15	1.8	5.55
Urad	-	-	5.0	-	-	-	33.4	-
Barbat(Cpd)	0.003	0.02	0.2	15.0	0.02	0.03	1.0	2.0
Other pulses	0.001	0.01	0.001	100.0	0.001	-	0.05	2.00
Total pulses	3.0	24.0	20.7	14.49	7.0	10.9	105.9	6.58
Total goodgrain	6.7	53.6	63.3	10.58	43.3	67.76	399.1	10.84
Sugarcane	0.1	0.8	0.1	100.00	8.4	13.14	8.5	98.82
Total fruits & Vegetables	5.0	40.0	5.1	98.04	9.5	14.86	11.3	84.07
Total Condiments & Spices	0.2	2.4	0.6	49.99	2.3	3.6	3.0	76.66
Total food crops	12.1	96.8	69.1	17.51	63.5	99.37	421.9	15.05
Groundnut	0.07	0.6	3.0	2.33	0.07	0.11	11.9	0.58
Sesamum	-	-	0.4	-	-	-	2.5	-
Soybean	-	-	8.8	-	0.002	-	55.6	-
Linseed	0.01	0.08	0.2	3.6	0.03	0.04	1.2	2.49
Mustard	-	-	-	-	0.02	0.03	0.4	5.6
Ramtil	-	-	-	-	-	-	37.4	-
Other Oilseeds	0.007	0.05	0.05	14.0	-	-	0.5	-
Total Oilseeds	0.09	0.7	12.5	0.72	0.12	0.18	109.5	0.11
Cotton	0.3	2.4	8.0	3.75	0.3	0.47	8.0	37.5
Fodder	-	-	8.2	-	-	-	9.2	-
Total Non-food crop	0.4	3.2	28.7	1.39	6.42	0.63	17.2	2.44
Total cropped area	12.5	100.0	97.8	12.78	63.92	100.00	548.6	11.65

3.11.7 Fertilizer consumption

The fertiliser consumption per hectare of cropped area was 20.25 kg. for Chhindwara district. It was highest (30.70 kg.) in sub-region III followed by (23.20 kg.) in sub-region II. The sub-region I had the lowest (2.85 kg.) consumption. (Table 3.12).

Table 3.12 Fertiliser consumption in sub regions Chhindwara district- 1988-89

Particulars	Sub regions			Total
	I	II	III	
Total Consumption (Thousand Kgs.)	343	7840	3218	11401
Cropped area (Thousand hectares)	120.3	337.9	104.8	563.0
Consumption per hectare of cropped area (kg.)	2.85	23.20	30.70	20.25

3.11.8 High Yielding Varieties Programme

In the case of paddy the percentage of coverage of H.Y.V. to cropped area was highest (82.68) in sub-region II followed by 74.35 and 65.37 in sub-region-III and I respectively.

In the case of jowar the percentage of coverage of H.Y.V. to cropped area was highest (75.98) in sub-region III followed by 64.59 and 46.23 in sub-regions II and I respectively.

In the case of wheat the percentage of coverage of H.Y.V. to cropped area was highest (93.09) in sub-region III. In sub-region I and II it was about 65 per cent individually. This coverage indicates the successful implementation of the H.Y.V. Programme in all the three sub-regions and the district as a whole. (Table 3.13)

Table 3.13 Coverage of High yielding varieties, sub regions Chhindwara district, 1987-88

(Area- Hectares)

Particulars	Sub- regions			Total
	I	II	III	
I. Paddy				
Cropped area	7100	16200	2000	25300
Achievement of H.Y.V.	4663	13395	1487	19545
Percentage of HYV to cropped area	65.67	82.68	74.35	77.25
II. Jowar				
Cropped area	6100	40800	34000	80900
Achievement of H.Y.V.	2820	26352	25832	55004
Percentage of HYV to cropped area	46.23	64.59	75.98	67.99
III. Wheat				
Cropped area	11600	62600	5500	79700
Achievement of H.Y.V.	7549	40426	5120	53095
Percentage of HYV to cropped area	65.08	64.57	93.09	66.62

3.11.9 Adoption of Improved Practices

In the matter of adoption of improved practices sub-region-I took the lead. It had highest percentage of area under seed treatment to target area (113.23). It also had highest percentage (134.58) of area under rodent control. There was considerably high percentage of area under plant protection in sub-regions I and II (Table 3.14).

Table 3.14 Percentage of achievement to target area under different improved practices, sub-regions, Chhindwara district, (1987-88)

(Figures-percentage)

Particulars	Sub-regions			Total
	I	II	III	
Seed Treatment	113.23	110.82	109.13	110.98
Plant Protection	115.72	115.75	107.31	113.71
Rodent Control	134.58	86.12	88.91	91.52
Weed Control	6.76	3.58	1.57	3.47

3.11.10 Productivity of Crops

It was observed that the yield of paddy did not vary much between the three sub-regions. Wheat and jowar yield was higher in sub-region II and that of maize it did not vary much between the three sub-regions. In the case of kodo-kutki the yield was highest in sub-region II followed by 497 and 470 in sub-region I and III respectively. While the yield of gram and soybean was highest in sub-region II and that of groundnut was highest in sub-region-I. (Table 3.15)

Table 3.15 Yield per hectare, sub-regions, Chhindwara district (1988-89)

(Figures- Kg.per hectare)

Crop	Sub-regions			Total
	I	II	III	
Jowar	1700	1724	1701	1712
Maize	2418	2474	2500	2194
Paddy	959	1130	956	1071
Kodo-kutki	497	507	470	500
Wheat	953	1176	1000	1127
Tur	1615	1752	2122	1860
Moong	500	583	500	558
Urad	390	380	188	351
Gram	600	602	591	600
Pea	500	441	500	450
Lentil	-	533	-	533
Soybean	1155	1197	1189	1183
Groundnut	1904	1175	1204	1203
Niger	312	362	666	351

3.11.11 Livestock

The percentage of different kinds of livestock was similar in sub-region I and III. The cattle constituted between 54 to 57 per cent, buffaloes 13.59 in sub-region II and goats 19.62 per cent in sub-region III, because of the numerous cities and towns, had a different kind of livestock composition poultry formed as high as 23.72 per cent of the livestock in sub-region-I followed by 23.04 and 15.46 in sub-region-II and III respectively. (Table 3.16)

The percentage of area under permanent pastures and grazing land is only 4.80. No major development schemes for improvement of livestock production have been launched. However, the operation flood scheme has recently been introduced to cover the district. The potential for livestock production and mixed farming particularly in the district like Chhindwara which has a considerable tribal population remains practically unexploited.

Table 3.16 Livestock population, sub-regions, Chhindwara district.

Livestock	Sub-region-I		Sub-region II		Sub region III		Total	
	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total	Number	Percentage to total
Cattle	231036	54.20	307799	43.75	133264	56.73	672099	49.25
Buffaloes	29960	7.03	95615	13.59	11135	4.74	136710	10.02
Goats	59381	13.93	131982	18.76	46086	19.62	237449	17.40
Sheep	168	0.04	581	0.08	3563	1.52	4312	0.31
Horses & Ponies	2617	0.61	3359	0.48	446	0.19	6422	0.47
Pigs	1997	0.47	2140	0.30	4082	1.74	8219	0.60
Poultry	101115	23.72	162061	23.04	36316	15.46	299492	21.95
Total	426274	100.00	703537	100.00	234892	100.00	1364703	100.00

3.11.12 Population :

As mentioned earlier the total population of Chhindwara district was 12,32,735. Of this the rural population was 9,94,929.

The Characteristics of population in the sub-regions described hereafter refer to rural population.

The proportion of male to female population was 50:50. It was equal in all the three sub-regions. The average literacy percentage was 21.33. It was significantly higher in the case of males (31.39 per cent) than females (11.11 per cent). (Table 3.17)

Table 3.17 Rural population characteristics, sub regions of Chhindwara district, 1981

Particulars	Sub-regions			Total
	I	II	III	
Total rural population (Numbers)	231050	539741	223538	9,94,929
Proportion of Male: Female	50:50	50:50	50:50	50:50
Literacy percentage :				
Total	16.80	20.75	27.42	21.33
Male	24.48	31.74	37.69	31.39
Female	8.99	9.60	16.98	11.11

Of the total rural population 43.43 per cent were workers and 52.45 per cent, non workers. (Table 3.18)

Table 3.18 Proportion of workers, non-workers and Marginal workers in rural population of sub-regions, Chhindwara district, 1981

(Figures in percentage)

Particulars	Sub-regions			Total
	I	II	III	
Workers	40.97	41.65	51.34	43.43
Non-workers	54.77	53.80	45.90	52.45
Marginal Workers	4.25	4.55	2.76	4.12
Total	100.00	100.00	100.00	100.00

Cultivators constituted 53.33 per cent of the total workers and agricultural labours, 32.26 per cent. Thus these two classes together formed about 86 per cent of the working population. The percentage was highest (90.22) in sub-region-III and lowest in sub-region-I (80-72). Conversely the proportion of workers belonging to non-agricultural occupations was highest (19.28) in sub-region-I and lowest (9.78) in sub-region-III indicating the difference in dependence of rural population on non-agricultural occupations in different sub-regions (Table 3.19).

Table 3.19 Occupationwise percentage distribution of rural working population, sub-regions, Chhindwara district 1981

Particulars	Sub- region			Total
	I	II	III	
Cultivators	62.14	51.09	50.08	53.33
Agricultural Labours	18.58	34.50	40.14	32.26
Household Industry (Manufacturing, Processing, Servicing and repairs)	1.33	2.05	1.95	1.87
Other Workers	17.95	12.36	7.83	12.54
Total Workers	100.00	100.00	100.00	100 .00

The percentage of scheduled castes population varied between 9 to 12 in three sub-regions. It was lowest in sub-region-III. On the other hand the scheduled tribes population constituted a very high percentage (64.21) in sub-region-I as compared to other sub-regions (32.41 and 26.87 respectively). Conversely the percentage of other castes population in sub-region I was lower (24.95) than the other two sub-regions (55.93 and 63.85 respectively). (Table 3.20).

Table 3.20 Distribution of rural population by castes sub-regions, Chhindwara district

Particulars	Sub-region-I		Sub-region-II		Sub-region-III		Total Chhindwara district.	
	No.	Percen-tage	No.	Percen-tage	No.	Percen-tage	No.	Percen-tage
Scheduled Caste	25689	10.84	62920	11.66	20749	9.28	109358	10.94
Scheduled Tribes	152126	64.21	174924	32.41	60054	26.87	387104	38.70
Others	59098	24.95	301897	55.93	142735	63.85	503730	50.36
Total	236913	100.00	539741	100.00	223538	100.00	1000192	100.00

CONSTRAINTS TO GROWTH

The performance of agriculture in all the three sub-regions of the district, especially in foodgrains production during the last decade has been sluggish. Foodgrain production has not kept pace with the population growth. As a result, the district is deficient in food supply. Given the expected increase in population, the demand for foodgrain will considerably outstrip the supply, if the current production trends are not improved.

The sheer need to increase food production to meet the requirements of its growing population calls for special efforts to improve production. As there is no further slope for expansion in area, such improvements in production can be accomplished only through double and multiple cropping and stepping up yields in the sub-regions of the districts.

The principal food crops grown in the sub-regions in kharif are kodo-kutki, jowar and maize. Among the rabi cereals wheat is the important crop with a coverage only next to the most important kharif cereal i.e. jowar. Other food crops i.e. pulses (moong, urad, arhar, gram and lentil) are grown in rabi season. vegetables crops are grown throughout the year besides oranges for which it is famous.

Even in regard to non-food crops such as cotton and oilseeds (niger and groundnut) the increase in yields being modest. It will be necessary to improve their yields and also resort to multiple cropping to enable the farmers to get better return from the cultivation of these crops.

The productivity of soybean in the sub-regions of the district is always higher than its average productivity in Madhya Pradesh State. In fact out of 45 district in M.P. the highest yield of soybean during the last five years has been from Chhindwara district.

Two more dimensions of the problem of these sub-region's agriculture need to be recognised. First is the vagaries of the monsoon which cause considerable instability in agricultural production as sub-regions has only 10.79 per cent irrigated area mainly through wells (86.7 per cent) followed by canal and tanks. Second is the incidence of poverty which is very high, particularly in tribal areas of the sub-regions. In abnormal years of production, the population below the poverty line suffers severely. Unless special efforts are made to stabilize agricultural production at higher growth level, it is unlikely that the sub-regions can make a dent on the problem of poverty.

Clearly, a significant departure from the past production strategy will be necessary if the objective of increase in agricultural productivity and a rise in the standard of living of the rural poor are to be attained. The development strategy should aim at not only raising land productivity through land saving measures and yield augmenting imputs, but also labour productivity so as to improve the income of agricultural workers. These could not be achieved so far because of several constraints.

Before outlining the strategy for accelerated development, it is first necessary to identify the main constraints which impeded intensification of agriculture so far. The constraints are common to district as a whole, however, they are summarised

below sub-region-wise to facilitate the adoption of appropriate remedial measures by the concerned authorities.

3.12 Sub-region I (High ranges of Satpura)(blocks included are Junnardeo, Tamia and Harrai)

3.12.1 The farming situations in this sub-region are as below :

(i) High hills with steep slopes: Under this farming situation the hills are predominant which are very steep with slopes ranging upto 80%. The soils are skeletal gravelly with dense reserve forests. Under this farming situation cultivation of crops is practically negligable. The forests are being managed by the forest department of State Government.

(ii) Hillocks with Moderate Slopes : Under this situation small hillocks are found which have moderate slopes and it constitute about 45% of cultivated pond of this situation. About 50% of this land is being utilized to grow kodo-kutki and Niger by the tribals of this sub-region.

3.12.2 Specific constraints Identified :

(i) Soils are marginal and sub-marginal with very poor soil depth and poor moisture retentivity.

(ii) Soils are low in nutrient content.

(iii) These soils are problemetic from the management point of view as these soils be come soft when rains and become hard when dry.

(iv) This is predominantly monocrop area.

(v) Agricultural occupation is confined only for four months.

(vi) Irrigation facilities are not available.

(vii) Only Kodo-kutki and niger crops are grown which are very low yielding (180 kg/ha of kodo-kutki and 160 kg/ha of Niger).

(viii) The tribal cultivators of this sub-region are very poor.

3.12.3 Available Technology

On the basis of researches conducted following technology has been generated and recommended for this sub-region.

(i) High yielding varieties of kodo(15 kg.) and kutki (20 kg.) with very good yield potential of 15 and 20 Q/ha have been identified and recommended.

(ii) For upland areas, very early varieties of paddy i.e.JR-15-75-2-8 and JR-75 have been identified and recommended for paddy growing farmers and the same has also been recommended as a replacement of kodo and kutki.

(iii) In niger variety Ootacmund has been identified and recommended as a suitable variety with high yield potential of 500 kg/ha. Niger has also been suggested as a substitute for kodo and kutki to improve financial status of the tribal farmers as well as to boost production of oilseed crop in this sub-region.

(iv) Keeping in view the available rainfall and drainage of the soil, efforts to provide suitable tuber crops under rainfed situation for the tribal has also undertaken.

The results of experiments of research as well as demonstrations on farmers field has indicated that kharif potato has good potential under this farming situation. The average yields rested to 230-250 Q/ha with maximum yields of 300 Q/ha. Varieties kufri-Chandramukhi and Lalima have been identified as most suitable over the farmers variety kufri-sindhuri, which under these conditions yielded only 80 Q/ha.

3.12.4 Research Needs

(i) To improve water retention capacity by identifying suitable cover crops and to check erosion, contour, bunding, strip cropping system needs to be worked out.

(ii) To see whether these lands can be utilized by growing economic forest trees viz. Chironjee, Mahua, Amla, Ber, custard apple, Tamerind, Bhilma, kanjee.

(iii) Being mono-kharif sub-region the agricultural activities are confined only for 4 months in a year. In order to generate employment for rest of the month of the year, researches on live-stock (dairy) and agriculture based farming system needs to be carried out. Possibility of sericulture industry needs to be explored.

(iv) Since kodo-kutki is less remunerative, efforts are needed to substitute its area under more remunerative crop like niger.

(v) To develop suitable production technology for growing niger under rolling topography.

(vi) Possibility of Bee keeping as an industry in niger growing areas to improve the economic status of the farmers as well it will also help in proper pollination and seed setting in niger.

3.13 Sub-region II (Plateau of Satpura)
(blocks included are Amarwara, Chaurai, Bichhua, Mohkhed Chhindwara and Parasia)

3.13.1 This sub region II having moderate slop, embedded with hillocks and rocks. The elevation of the location is 400-800 meters above mean sea leavel. Soil are shallow black-loamy clay. Red

loam and loamy. The soil depth varies from 25 cm. to 50cm. with medium retentivity of moisture and low fertility. This agro-ecological situation has about 12% of its area irrigated mainly through wells. Rainfall of this situation is 1000-1200 mm. per year.

3.13.2 Jowar and wheat are the main crop of this sub-region and other crops are Arhar, Urad, Niger, Maize, Gram, Soybean and vegetables.

3.13.3 Specific Constraints Identified

(i) This sub-region includes various type of soil from sandy on hillocks to silty black on clayey silt at their basement. It therefore includes various problems of soil management. Hillocks soils are well drained with poor retension of moisture. These soil became readily workable immediately after rains/irrigation, while they become hard and unworkable with loss of moisture. Crops start showing sign of wilting within 5-7 days after rains, Temporary wilting of almost all the crops is most predominant feature when they are at productive stage specially with the failure of late monsoon.

(ii) Soils of this situation are low in fertility.

(iii) Mostly late maturing low yielding local varieties of jowar are grown by the farmers, which suffer due to failure of late monsoon.

(iv) During 1982-85 the local jowar has been partially replaced by hybrid jowar but has poor fodder quality.

(v) In maize also similar is problem, farmers are growing advanced generation of maize hybrids.

(vi) Wheat is grown under heavy (10-15) irrigation in light red laterite soils. Which is wastage of irrigation water.

(vii) Wheat is sown by broadcasting of heavy seed rate and then applying heavy irrigation, leading to lodging and low yields.

(viii) Late maturing varieties of Arhar are grown in light soils which suffer due to wilting in the early stage and moisture stress at flowering and pod filling stage.

(ix) Yield levels of urad are very low mainly due to local varieties which are highly susceptible to powdary milden.

(x) Niger is also having very low yield levels, mainly due to poor management/production practices adopted by the farmers. High yielding varieties with high oil content are needed.

(xi) Gram suffers due to furarium wilt as most of the area is wilt sick and the varieties grown by the farmers are susceptible to this wilt.

(xii) Kalitur (Black-soybean) is also grown for it's ability to grow even under adverse situations, but it is highly shattering type.

(xiii) Kodo-kutki are very low yielding and loss remunerative.

(xiv) There is no source of supply of certified seed of potato which is the biggest constraint of increasing productivity of this crop.

(xv) The farmers are ignorant of high yielding, disease resistant varieties and appropriate management practices of potato cultivation.

(xvi) Although green chillies, for export purposes, are grown almost all the year round but the information on varietal

suitability, crop management practices, pest and diseases are lacking.

(xvii) Ginger cultivation has to come to almost extent due prevelance of soft rot disease.

(xviii) Onion and garlic though are important Vegetables of bulbus group. The information is lacking on rabi varietal identification management and pest control.

xix) Though the farmers are aware of the improved varieties, but due to lack of availability of seed, these are confined to a limited area.

(xx) Fersarium wilt in gram and mosaic virus in moong and urad are the problems of this sub-region.

(xxi) Ginger cultivation are almost become extinct due to prevalance of soft rot.

(xxii) Availability of certified seed of improved varieties of potato is meagre which is the biggest constraint in increasing productivity of this vegetable crop.

3.13.4 Available Technology

(i) For the improvement of soil texture and to increase the water retention capacity and fertility, soybean cultivation in kharif has been recommended. It will give good cover as well as good return per hectare as compared to kodo and kutki presently grown by the farmers.

(ii) Intercropping Jowar with Arhar in 6:2 row ratio is more remunerative as compared to sole crop of jowar, hence it has been recommended for this sub region.

(iii) It has been reported by the farmers that the composits SPV-472 and SPV-475 are acceptable which have matching yields with the hybrids (35.0 Q/ha) with additional advantage of palatable

fodder value.

(iv) Varietal response to recommended fertilizer dose (100 N:60-P_2O_5: 40K kg/ha) has been worked out and composits SPV-472 and 475 were found highly responsive to this dose and has been recommonded in the sub-region.

(v) Hybrid maize cultivation needs every year seed replacement and protective irrigation at the time of tasilling and silking under this farming situation, hence to overcome this, maize composit chandan-3 has been evolved and has been recommended for this sub-region.

(vi) Wheat should be line sown and varieties suitable for moderate irrigations should be grown with 2-3 irrigations only. This practice will lead to sowing of seed and irrigation water and will save the crop from demage due to lodging.

(vii) Arhar varieties T-21 (Early), No.148 (Medium maturing) are identified for this sub-region and recommended, These varieties are high yielding (12-15 Q/ha).

(viii) In urad, variety T-9 (early) and No.55 suitable and were indentified for this sub-region. However there is need for breeding Powdery mildew resistant varieties.

(ix) Regional Agriculture Research Station Chhindwara has developed an improved production technology of Niger crop and it has been proved that by adopting this technology about 105% increased yield of Niger can be obtained.

(x) Gram variety JG-315 has been indentified as wilt resistant high yielding variety and it has been recommended for this sub-region.

(xi) In soybean variety Shyma (black-soybean) is recommended to replace Kalitur as it is tolerant to shattering and gives higher yields.

Yellow soybean variety JS-72-44 was also identified and recommended.

(xii) In this sub-region also, it has been suggested to replace kodo-kutki cultivation by other high remuneration crop viz. Niger.

(xiii) Regional Agricultural Research Station, Chhindwara (RARS) has developed and recommended the disease free seed production technology which should be adopted by the farmers in order to increase the production and productivity of this crop.

(xiv) The RARS, Chhindwara has Identified JCA-218 variety of Chillies which is tolarant to Churda-Murda disease (10%) and it also has good yield potential.

(xv) Survey work by the scientist have to revealed that species of Pusorium and Pythicm are involved in soft-rot ginger, alongwith this the problem has further aggrevated with the occurance of white grabs, preliminary yield trials on chemical control of these disease revealed that seed treatment with Bavistin and copper based fungicides minimise the infection, but on field adoption these treatments have not been appreciated by the farmers due to heavy cost of fungicides.

(xvi) In Onion's taking advantage of moderate climate prevelent in this situation growing of kharif onion has proved very successful with yield potential up to 300 Q/ha. Two varieties (N-53 and Nasik red) have been recommended for kharif planting.

(xvii) In garlic severe incidence of onion maggots have been indentified as constraints for lower yield.

3.13.5 Research Needs

(i) Identification/Breeding of short duration varieties with high yielding ability is necessary to overcome the failure of crop in jowar, maize, groundnut, urad and moong.

(ii) Identification of wilt resistant varieties in arhar is the Primary need of the sub-region to increase production as well as productivity of the crop.

(iii) To breed wheat varieties suitable for moderate irrigation and fertility condition.

(iv) Identification/Breeding of powdery mildew resistant varieties in moong and urad is desired.

(v) Identification work for finding out completely non-shattering over JS-72-44 (Yellow) and Shyma (Black seeded) of soybean is very much needed.

(vi) To economize the cost on seed of potato which accounts for 50% of the total cost of cultivation, cheaper sources of crop raising such as true potato seed, stem cutting etc. needs to be studied.

(vii) A research project on problematic grouping vegetable crops which namely chillies, ginger, onion and garlic is suggested.

(viii) Animal husbandry particularly dairy farming potential of this situation, The performance of cross breed milk animals have been successful and becomes popular, therefore, researches on animal husbandry based farming system is proposed.

3.14 Sub-region III (Plains of Satpura)
(blocks included are Sausar and Pandhurna)

3.14.1 The topography of this sub-region is predominantly plain

with scattered small hillocks. Soils of this situation are black and clayey loam, ill drained heavy textured and low fertility, but are of high yield potential if properly managed. These soils have high retentivity of water. In this situation irrigation is very limited, mostly through wells and utilised in orchards and wheat fields. Rainfall varies from 800-1000 mm.

3.14.2 Jowar is the main crop of this sub-region followed by kodo-kutki wheat, soybean, arhar, groundnut, and maize. This sub-region also grows two special crops i.e. cotton and oranges though small in acreage but intensive in their cultivation. These two crops are agricultural labour employment oriented to a limited extent.

3.14.3 Specific constraints Identified

(i) Soils of this situation are having very poor drainage, hence creates problem in interculture operations.

(ii) A sizeble area in this situation is still under Deshi Jowar which is very low yielding and late in maturity and therefore forbids planting of rabi crops.

(iii) Wheat, gram and arhar yields are very low as farmers are still growing their local seed bulk which is low yielding as well as susceptible to diseases and pets.

(iv) Nagpur variety of oranges are grown in this situation. The orchards are deteriorating each year because of the sooty mould disease. There are also number of other diseases viz. dicback. Iummosis, and other which have also been identified which are responsible for degeneration of orchards.

(v) Hybrid cotton variety JKH-1 has been observed to be susceptibls to with due to failure of late mansoon.

(vi) Almost no imputs are given to the crop grown under rainfed conditions.

3.14.4 Technology Available

(i) In poor drained soils, soybean cultivation is recommended which will improve the soil texture and fertility alongwith good returns per hectare.

(ii) In waterlogged areas early maturing paddy varieties viz. JR-15-75-2-8 and JR-75 should be grown.

(iii) All the Deshi Jowar should be replaced by composit sorghum varieties viz. SPV-472 and SPV-475 Which have been identified as suitable varieties for grain yields as for good fodder quality.

(iv) Kodo-kutki : are is suggested to be brought under other more remunerative oilseed crops like niger in coarse soils and soybean in light medium soils.

(v) Recommended varieties of wheat and arhar for this sub-region should be grown in place of farmers local bulk.

(vi) Preliminary survey work on sooty mould has been carried out by the scientists of Regional Agricultural Research station, Chhindwara. Whitely and black fly alongwith citrus psycilla have been identified as species of insects involved for the spread of this disease.

3.14.5 Research Needs

(i) Early maturity, Non shattering soybean varieties are required to be evolved.

(ii) Wilt resistant hybrid varieties of cotton should be bred otherwise area under this crop will reduce further.

(iii) Being very Sophesticated crop and therefore to make orange cultivation more productive and profitable. Several aspects of crop management viz, identification of root stock scion, relationship, water requirement, nutritional requirement, regulation of crop etc. need to be worked out.

SPECIFIC DEVELOPMENT STRATEGY FOR SUB- REGIONS

3.15 Crop production is almost entirely (about 90 per cent) dependant on rainfall in sub-regions I, II and III of the district. It receives an average annual rainfall of about 700-1400 mm. The soils vary from light reddish-brown to black clay loam with very low water retention capacity. These sub regions have three distinct farming situations i.e. (i) High ranges of Satpura having more than 1200 mm annual rainfall and highly sloppy topography and shallow soils; (iii) Plateau of Satpura with 1000-1200 mm. annual rainfall; (iii) Plains of Satpura with less than 1000 mm. annual rainfall. Wherever irrigation facilities are available excellant vegetable crops including potato can be grown successfully. In rainfed conditions, jowar, maize, arhar, gram, soybean are important crops. To increase productivity of vegetables and field crops, efforts in developing appropriate tillage practices, screening and development of varieties coinciding with growing season and moisture availability period, management of disease and pests, and proper nutrient management under different cropping systems need to be developed.

The district has total population 12,32,735 of which 78.82 per cent is rural comprising 56.32 per cent of tribals with 28.2 per cent literacy and density of population 104 per sq.km. Total farmers in the district are 2,33,600 of which 36 per cent small

and marginal ones. This being so, any developmental strategy for these sub-regions shoud aim at solving problems of the small and marginal farmers and improving their economical condition. In this context, apart from the regular services already being rendered on crop production technology and extension the development strategy from now onwards should give more and more emphasis on sub-regions development approach, taking a sub-region as a unit. Following are few more specific suggestions for all the three sub-regions of the district which need attention.

3.16 Crop Improvement :

(i) Development of high yielding varieties of niger, sorghum, maize, soybean, tur and gram which may fit well in double cropping system in these sub-regions.

(ii) The local deshi jowar which is extensively grown by cultivators suffers due to long dry spell of monsoon and results in poor yields. There is an urgent necessity to develop dual purpose short duration and drought resistant sorghum varieties.

(iii) Development of varieties resistant to wilt in gram, mosaic virus in moong and urid.

3.17 Soil, Agronomy and Agricultural Engineering :

(i) In black cotton soil, establishment of crop stand in rabi season is a serious problem because of lack of moisture in top soil and poor seed bed preparation. Efforts are needed to test suitable implements and seeding devices to secure good crop stand.

(ii) The district is predominantly non-cropped area. There is a need to work out suitable crop sequences to increase the cropping intensity.

(iii) In shallow soils, low moisture retention as well as poor nutrient availability is a serious factor responsible for low yields. Therefore, efforts are required to work out appropriate manurial schedule including use of organic and inorganic manures and wherever possible inclusion of green manuring crop for improving water retention capacity and productivity of soils.

(iv) Whatever limited irrigation facilities are available, water is a scarce commodity. Efforts are therefore needed to workout proper schedule and methods of irrigation for more remunerative crops. Water production functions of different crops with protective irrigation need to be worked out.

3.18 Vegetable crops :

Potato is becoming a major vegetable crop in this area. Besides, other vegetables like caultiflower, cabbage, cucurbits etc. are also grown. Some of the important problems need to be tackled are as follows:-

(i) To identify suitable high yielding varieties of potato for kharif as well as main season.

(ii) To economise the cost of seed of potato which accounts for 50% of total cost of cultivation, cheaper sources of crop raising such as use of true potato seed (TPS), stem cuttings etc. need to be assesed.

(iii) To develop most profitable crop rotation for potato.

(iv) To study nutritional requirement of potato, weed control measures, and cultural practices.

(v) Studies on various chemicals to check sprouting in harvested potato.

(vi) Varietal evaluation of vegetables (other than potato) and their cultural practices.

(vii) To study various measures for minimising post-harvest losses in storage and transport.

3.19 Plant Protection :

(i) Wilt in gram and arhar and mosaic virus in moong and urid are serious problems. Besides developing resistant varieties, control measures for these diseases need to be developed.

(ii) Identification of important diseases and pests, periodicity of occurrence, survey and surveilence for forecasting important diseases and pests of crops grown in this district need to be studied.

3.20 Research-Extension linkage :

(i) There is urgent need to improve the quality of on-farm trials and testing production technology under different micro-farming situations in collaboration with the Department of Agriculture and other field functionaries.

(ii) Identification of socio-economic constraints in agricultural production.

3.21 The sub-region-II located in the high hills of Satpura Plateau of the district. Which receives about 1200 to 1400 mm. annual rainfall. Soils are skeletal gravelly with steep slopes and are surrounded by dense reserve forests. This is predominantly a mono crop (kharif) area with kodo-kutki and niger as important crops grown on very shallow and highly slopy lands with 1-2 q/ha yield. The irrigated area is very low (about 10%). Despite high rainfall, crops suffer due to drought because of highly slopy land with shallow soils having low water retention capacity.

Practically no fodder crop is cultivated. Animals largely depend on grazing resulting in their low productivity.

Crops like soybean, sorghum, til, urid, gram can also be grown successfully and productivity of kodo-kutki and niger can be improved substantially.

There is a possibility of introducing tuber and root crops. Animal enterprises need attention in terms of better nutrition for which locally available fodder resources need to be improved. Possibilities of growing grasses, fodder, grain and other high value vegetable crops alongwith forest trees need to be explored. Introduction of high value forest trees viz., chironjee, mahua, aonla, ber, custard apple, tamarind, bhimla and kanjee may be assessed.

Keeping in view these peculiar circumstances and poor economic condition of the predominantly tribal population following development strategies are suggested :

(i) To identify more suitable crops and varieties since kodo-kutki and niger are less remunerative crops.

(ii) Development of location specific crop production technology i.e. tillage requirement, seeding device, date of sowing, seed rate, plant population, doses of fertilizers and methods of application and cultural practices for weed control in kodo-kutki, niger, soybean sorghum, til and gram.

(iii) Introduction of suitable tuber and root crops and working out management practices for vegetable crops on shallow soils.

(iv) Introduction and testing of high value forest trees and exploring possibilities of inter-cropping of vegetables, fodder,

grasses and short/ duration pulses and oilseeds crops with forest trees.

(v) Developing devices for moisture conservation and efficient methods of irrigation on highly slopy and shallow soils.

(vi) Assessing fodder value of locally available crop and forest residues and improving their quality.

(vii) Introduction and testing of fodder trees, grasses and fodder crop for stall feeding with a view to improve animal health and productivity.

(viii) To develop suitable farming system involving crops, animals, bee keeping and sericulture for higher income and employment.

(ix) To conduct larger number of field demonstrations on improved crop production technology and arranging training of the farmers.

(x) Studies on adoption pattern and constraint analysis for non-adoption of improved technology.

3.22 Horticultural Aspect :

3.22.1 In sub-region III two blocks viz. Sausar and Pandhurna which contiguous of santra belt of Maharashtra are important mandarin orange producing centres. No efforts have been made in the past to improve this citrus growing sub-region in this district.

3.22.2 The existing orchards are facing many problems eventually yields of citrus trees have decreased in recent years. Citrus decline in this sub-region is mainly due to the factors like mal-nutrition, defective cultural practices and improper management of pest and diseases. The sooty mould disease locally known as 'Kolshi disease' caused by white flies has threatened the very existance of orchards.

3.22.3 Citrus production should be taken up on scientific lines in this sub-region and following production strategies be developed keeping in view the requirements of the country as a whole :-

(i) Collection and evaluation of varieties of loose skinned oranges and some arid zone fruits such as custard apple, pomegranate, ber etc.

(ii) Breeding of suitable varieties of mandarins and root stocks.

(iii) Studies on the effect of different root stocks on growth, yield and quality of Nagpur oranges and Mosambi.

(iv) Studies on the effect of different cultural operations such as nutrition, weed control, methods of irrigation, regulation of flowering on productivity and economic life of trees of Nagpur orange.

(v) Studies on causes and control of fruit drop in mandarin by using plant growth substances.

(vi) Identification of suitable inter crops for citrus orchards.

(vii) Survey of different insect pests and nematodes in the oranges and their control.

(viii) Population dynamics and bioecological studies of citrus psylla, fruit sucking moth and white fly and their control measures.

(ix) Studies on causes and control of 'Kolshi disease'.

(x) Survey of natural parasites and predators and exploring the possibility of biological control of pests of citrus.

(xi) Survellance of aphids of citrus acting as vector for tristeza virus and their control.

(xii) To develop effective messures for control of gummosis, bark scaling, citrus canker and viral diseases.

3.23 Animal Husbandry Aspects

The cattles are raised on farm by products and on grasses growing in land not used for cultivation comprising of pastures, fallows, cultivable waste etc. Advances in fodder production with introduction of berseem, cattle improvement programme through artificial insemination and disease control measures will form the thrust action programme in all the three sub-regions of the district. The identification of potential areas of egg.production will be an additional activity for raising the income level of the small and marginal farmers of all the three sub-regions of the district.

3.24 Socio-Economic Aspect

The object proverty and sccial deprivation of the weaker section of the farming community is a cause of concern. Research work on the socio-economic aspect of the small and marginal farmers with their poor economic base has remained almost untouched so far. The main thurst of the research work will be focussed to specify the various production constraints with regard to the estimation of graded technology and technological status of the small and marginal farmers particularly of the tribal areas of the sub-regions in the district. Impact of crop subsititution and adoption pattern of the improved technology in these sub-regions will form the location-specific priorities of investigation.

Annexure- 4.1

Monthly total rainfall (m.m.) in sub-region I (Junnardeo, Tamia and Harai blocks) of Chhindwara district (1987-88 to 1990-91)

Year	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	Total
1987-88	131.9	149.0	349.8	195.4	77.8	19.7	1.4	2.8	0.0	0.0	0.0	0.0	927.8
1988-89	245.8	341.3	343.6	116.3	41.5	0.0	0.0	0.0	0.0	31.9	0.0	0.0	1120.4
1989-90	240.5	160.7	518.4	84.6	0.0	5.9	24.5	1.6	24.7	7.2	3.5	92.4	1164.0
1990-91	349.4	508.4	299.6	342.9	74.0	0.0	18.3	0.0	3.4	24.5	0.0	0.0	1620.5
Mean Rainfall (m.m.)	241.9	289.8	377.8	184.8	48.3	6.4	11.1	1.1	7.0	15.9	0.9	23.1	1208.1
Standard Deviation	76.9	147.4	83.4	90.4	31.3	8.0	10.6	1.1	10.9	12.8	1.5	40.0	254.2
Co-efficient of variation	31.8	50.8	22.1	48.9	64.8	125.0	91.0	100.0	155.7	80.5	166.6	173.2	21.0

Annexure- 4.2

Monthly total rainfall (m.m.) in sub-region II (Amarwara, Chourai, Bichhua, Mohkhed, Chhindwara and Parasia blocks) of Chhindwara district (1987-88 to 1990-91)

Year	June	July	August	Sept.	Octo.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	Total
1987-88	152.2	159.0	230.7	63.7	78.0	26.5	0.0	3.5	0.0	0.0	0.0	0.0	724.6
1988-89	191.0	238.2	194.8	165.7	39.2	0.0	0.0	0.0	0.0	23.5	0.0	0.0	852.4
1989-90	259.7	111.4	237.8	46.1	10.6	15.6	19.6	3.4	14.9	7.8	5.1	56.1	788.1
1990-91	220.9	278.7	263.5	141.7	97.0	0.0	18.4	0.0	0.0	22.3	0.0	7.3	1049.8
Mean Rainfall (m.m.)	205.9	196.8	231.7	104.3	56.2	10.5	9.5	1.7	3.7	13.4	1.3	15.8	853.7
Standard Deviation	39.4	65.4	24.5	50.5	33.6	11.2	11.9	1.7	6.4	9.9	2.2	23.4	121.9
Co-efficient of Variation	19.1	33.3	10.6	48.4	59.8	106.6	124.7	100.0	174.3	73.9	169.8	148.3	14.3

Annexure- 4.3

Monthly Total rainfall (m.m.) in sub-region III (Sausar and Pandurna Blocks) of Chhindwara district (1987-88 to 1990-91)

Year	June	July	August	Sept.	Octo.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	Total
1987-88	138.0	156.4	230.7	35.6	52.5	72.6	0.0	0.0	0.0	0.0	0.0	0.0	685.8
1988-89	206.6	236.6	304.0	296.9	31.6	0.0	0.0	0.0	0.0	37.0	0.0	0.0	1112.7
1989-90	315.2	186.2	225.6	64.8	7.6	0.0	22.2	6.9	14.4	0.0	0.0	26.9	869.8
1990-91	197.3	227.1	133.9	96.0	60.2	0.0	4.9	0.0	0.0	22.5	0.0	0.0	741.9
Mean Rainfall(m.m.)	214.3	201.6	223.5	123.3	37.9	18.1	7.3	1.7	3.6	14.9	0.0	6.7	852.5
Standard Deviation	63.9	32.6	60.3	97.2	20.4	31.4	8.7	2.9	6.2	15.7	0.0	11.6	405.7
Co-efficient of Variation	29.8	16.0	27.0	78.8	53.9	173.7	119.6	175.7	173.2	105.6	0.0	173.9	47.6

CHAPTER 4

RESEARCH INFRASTRUCTURE

4.1 Regional Agriculture Research Station

4.1.1 The Agricultural Research Farm, Chhindwara is situated about 3 kms. away from the town on Chhindwara-Nagpur main road in the village, Chandangaon. The total area of the farm is about 28 hectare of which about 23.4 hectares are under cultivation. This farm has gained all India importance with the establishment of the Maize Research Station in the year 1960. This is the only station in the state devoted to research on maize and is a part of the All India Coordinated Maize Improvement Project, which is financed by the Indian Council of Agricultural Research and has many firsts to its credit in the field of Agricultural Research in our country. It has its own laboratory-cum-office building [illegible] in the year 1964.

4.1.2 The farm was established in the year 1919-20 by the then Government of the Central Provinces and Berar with the object of conducting experiments on fruits and vegetables and important cereal crops. Consequently, it was designated as Govt.Experimental Farm. With the formation of the J.N. Krishi Vishwa Vidyalaya (JNKVV) at Jabalpur, on the American Land Grant College pattern, this farm was transferred from the State Govt.to the JNKVV in February, 1965.

4.1.3 With the changing importance and pattern, work on cereals, pulses, oilseeds and millets was intensified. Besides research on maize, a research project on Niger (Guirolia abyssinica) commonly known as 'Ram Til' or 'Jagani' having the maximum acreage of roughly 50 thousand hectares in this district, was under operation from 1965 till 1967. Similarly, another research project on Jowar (Sorghum Vulgare) was under operation from 1966 till 1969.

4..1.4 Looking to the importance of Potato crop and non-availability of its reliable quality seeds, a project for the "Survey of aphids of Potato" was in operation from 1966 until recently. The information gathered under this project is very vital for raising seed potato. A detailed research project on potato has commenced functioning from the current year (1970-71). This also is a part of All India Coordinated Project and will not only recommend the most suitable latest varieties for this area but would also investigate other agronomical aspects, like time of sowing, water requirement, optimum doses of fertilisers etc. Thus farm now be able to meet the long standing requirements of this district so far as the Potato cultivation is concerned.

4..1.5 In the year 1977-78 with the implementation of National Agril. Research Project by the J.N. Krishi Vishwa Vidyalaya. This centre was declared as Regional Agriculture Research Station for the region of Satpura Plateau.

4..1.6 At present this Regional Agriculture Research Station at Chhindwara is to tackle to some of the problems of the district. Looking into the problems of the district, J.N. Krishi Vishwa Vidyalaya, Jabalpur has proposed strengthening of Chhindwara research station as Zonal station with lead functions on potato & niger and verification work on maize, soybean, sorghum, tur & vegetables; and establishment of sub-station at Sausar to conduct research work on citrus and another sub-station at Tendni for verification work in respect of agro-forestry/silvipasture, animal nutrition, tuber crops, niger, kodo kutki and dryland horticulture. At Chhindwara following research and extension projects are in operation :-

(i) All India Coordinated Research Project on Maize Improvement

(ii) All India Coordinated Research Project on Potato Improvement

(iii) All India Coordinated Research Project on Niger Improvement

(iv) National Demonstration Project

(v) Establishment of Krishi Vigyan Kendra

(vi) Establishment of IERP Sub-Project

(vii) Agricultural Research Farm, Chhindwara

4.2 Appropriate Technology for District

4.2.1 There is now a general agreement that planned efforts must be made to increase agricultural production of Chhindwara district through modern technique of farming. Such efforts should be so designed as to cater to the specific needs of cultivators particularly small and marginal farmers. On the basis of researches conducted from 1980 to 1986 at Regional Agricultural Research Station, Chhindwara, following technology has been generated and recommended for this agro-ecological situation:

(i) High yielding varieties of kodo (15 Kr) and kutki (20 kr) with very good yield potential of 15 and 20 Q/ha have been identified and recommended.

(ii) For upland areas, very early varieties of paddy i.e. JR-15-75 recommended for paddy growing farmers and the same has also been recommended as a replacement of kodo and kutki.

(iii) In Niger variety Ootacmund has been identified and recommended as a suitable variety with high yield potential of 500 kg/ha. Niger has also been suggested as a substitute for kodo and kutki to improve financial status of the tribal farmers as well as to boost production of oilseed crop in this farming situation.

(iv) Keeping in view the available rainfall and drainage of the soil, efforts to provide suitable tuber crops under rainfed situation for the tribal has also undertaken.

4.2.2 The results of experiments of research as well as demonstrations on farmers field has indicated that kharif potato has good potential under this farming situation. The average yields rested to 230/250 Q/ha with maximum yields of 300 Q/ha. Varieties Kufri-Chandramukhi and Lalima have been identified as most suitable over the farmers variety Kufri-Sindhuri, which under these conditions yielded only 80 Q/ha.

4.3 Research Needs

4.3.1 Moreover, in spite of many handicaps quite a few farmers in Chhindwara district are gradually switching over a modern techniques of production. This indicates a potential for considerable productivity increase if adequate means are provided through a carefully planned research programme designed specifically for the district. The main areas which need special research attention are discussed below:

(i) To improve water retention capacity by identifying suitable cover crops and to check erosion, contour, bunding, strip cropping system needs to be worked out.

(ii) To see whether these lands can be utilised by growing economic forest trees viz. Chironjee, Mahua, Amla, Ber, Custard apple, Tamerind, Bhilma, and Kanjee.

(iii) Being mono-kharif area the agricultural activities are confined only for 4 months in a year. In order to generate employment for rest of the month of the year, researches on livestock (dairy) and agriculture based farming system needs to be carried

out. Possibility of sericulture industry needs to be exposed.

(iv) Since kodo- kutki is less remunerative efforts are needed to substitute its area under more remunerative crop like niger.

(v) To develop- suitable production technology for growing niger under rolling topography.

(vi) Possibility of Bee keeping as an industry in niger growing areas to improve the economic status of the farmers as well it will also help in proper pollination and seed selling in niger.

4.4 Testing of Technology

4.4.1 There exist an arrangement for the scientists to work with the farmers in 2-3 villages and test the research results in the fields with different research constraints in adoption of recommended practices and also to identify ways and means tc overcome them. Similarly, conduct of a small number (10-20) observational trials on seed farms and farmers fields, allows the scientists to varify the impact of research recommendations under varying soils,climatic and topographical situations. Field officers from the department of Agriculture are associated in planning and conduct of these trials. Research Agronomist provided at the Regional Agriculture Research Station is responsible for testing the recommendations generated from the applied research programme in the farmers field and works as liason officer between the scientists and the extension workers of the district.

4.5 Surveliance Visit by the Scientists

4.5.1 Periodical observations of crop situations, problems of pest and diseases is necessary so as to give timely suggestion to field workers for taking immediate measures of plant protection against diseases, pests and general management of crops at the

farmers level. This is ensured by periodical visits of the Scientists to the farmers fields in the district.

4 .6 Research Achievements

In the field of research the main objective of the Regional Agricultural Research Station (RARS) Chhindwara is to evolve new crop varieties, superior in yield, quality and other agronomical characteristics with resistence to important plant diseases. With a view to giving impetus to the agricultural production in the district, the RARS Chhindwara has been working intensively towards improving the genetic potential of following crops. Resultantly, many good varieties have been evolved and released for general cultivation of the farmers in the Chhindwara district. They are:

4.6.1 Maize : All India Coordinated Research Project on maize was in operation since 1982. As a result of research work in this Project, Hybrid Ganga-5, Ganga safed-2 and Daccan were found suitable with an yield of 5500-6000 kg/ha. These full duration hybrids (105-130 days) are acceptable provided that farmers are having assured irrigation facilities. For farmers growing maize under rainfed conditions following composits were developed and released.

Composits	Release year	Maturity days	Av.yield q/ha.
1. Chandan Makka -1	1973	105	55.60
2. Chandan Safed- 2	1972	70-75	25
3. Chandan Makka- 3	1976	90-95	50

Agronomical Practices

(i) Best time of sowing maize - 15th - 25th June

(ii) Most optimum plant population-
For hybrids 50,000-60,000 plants/ha.
For composits 68,000-80,000 plants/ha.

(iii) Fertilizer requirement

For hybrids 120 + 60 + 40 kg/ha of NPK
For composits 100 + 60 + 40 kg/ha of NPK

Note : The above fertiliser doses be applied as basal 1/3 N and full P & K and as top dressing 1/3 at 30-35 days (knee high stage) after sowing and second top dressing at 45 days (tasseling stage) after sowing.

4 .6.2 Potato : In potato following varieties in different maturity group have been identified.

(1)	Early	-	K. Chandramukhi & K. Lankar
(2)	Medium	-	K. Badsah, E 3797, E 4411 & E 5134
(3)	Medium Late	-	K. Sinduri, K.Chamatkar

Hybrid varieties B/S.C. 1753 (K.Lalima) and SLB/z 569 have also shown promising performance.

In addition packages of practices for maximised production of this crop have been developed and extended to the farmers field.

4 .6.3 Niger : (a) Variety Ootacamond is continuing to perform well in the region. Other promising varieties are composit 1, RCR 18, Phula 1, and I.G.P. 76

(b) For higher yield of niger, optimum time of sowing niger is third week of July.

(c) For maximised production of niger full packages of practices need to be adopted.

4 .6.4 Other crops : Following varieties of different crops have been identified as suitable for the district.

	Crop	Varieties
1.	Kodo	15 K.R. 14-81
2.	Kutki	20 K.R.
3.	Moong	M.L.131 both for kharif & Summer
4.	Urd	Pant U-30

5.	Sorghum	1. SPH 221 (Hybrid) 2. SPV 475 (Composit)
6.	Groundnut	JL 24
7.	Soybean	J.S.2, J.S.72-44 (Yellow) J.S.72-205 (Black)
8.	Wheat	Rainfed HI 617, N 1-2, N 195 Irrigated WH 147 (T.aestivum) Raj 1555 (T.durum)
9.	Gram	J.G. 315, J.G.1264, 1265
10.	Safflower	APRR 4&5
11.	Linseed	S.P.S. 23-10
12.	Onion	N 53
13.	Sweet Potato	J.I. 8-114
14.	Sesamum	J.T. 7

4.6.5 Entomology

(i) Thiodan 35 c.c. @ 1.5 litres/ha has been found most effective in control of gram cater Pillar Heliothis armigera with the highest Seed yield of 20.24 q/ha as against 13.08 q/ha. of untreated control.

(ii) Two sprayings with Malathion 0.05% controls the cauliflower aphid most effectively.

(iii) Two sprayings at an interval of 15 days just after pest emergence with Endo sulfan 0.07% effectively control jowar stem borer Chilopartellus.

(iv) Application of phorate 10G @ 15 kg/ha. in Nursery and same quantity in the field at the time at transplanting together with 8 sprayings with sulfax 0.3% Dimethoate at an interval of 20 days effectively controlled leaf Curl disease of chillies and recorded highest yield of 12.46 q/ha. of dry chillies as against 2.47 q/ha. in untreated control.

(v) For control of white and black fly causing Kolsi disease in orange orchards 2 spraying at an interval of 15 days with Phesalane 35c.c. and Methyl Demeton 25c.c. @ 1000 ml/ 100 trees have been found most effective. The average cost of single spray varies from Rs.129 to 132/100 trees.

4 .7 Krishi Vigyan Kendra

The all India Coordinated project on National Demonstrations sponsored by ICAR continued to function at the Regional Agricultural Research Station, Chhindwara, under the auspices of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur during the year 1980-81. After the establishment of Krishi Vigyan Kendra at Chhindwara in 1984. The project of N.D. continued to work under Krishi Vigyan Kendra at this station.

4 .8 Objectives of Krishi Vigyan Kendra

(i) To demonstrate convincingly to farmers the production potentialities of a unit area of land by using high yielding varieties of crops and adopting multiple cropping programme and package of practices such as balanced use of fertilisers effective water management techniques.

(ii) To demonstrate use of improved implements for different operations and use of soil testing labs for balanced use of fertilisers.

(iii) To fully exploit these demonstrations for the purpose of training farmers in improved cultivation practices and to use them as recognised and effective audio-visual aid for the flow of latest techniquse and results to farmers.

(iv) To provide the research workers first hand knowledge of the problems faced by the farmers in growing high yielding varieties and in following multiple cropping patterns.

(v) To minimise the time lag between the research generated and its application in the fields.

4 .9 Area covered under National Demonstration Programme

4 .9.1 The district has 7 tahsils namely Chhindwara, Pandhurna, Sausar, Parasia, Amarwara, Chourai, Jamai with 11 blocks. Out of these 7 blocks have been covered under National Demonstration Programme. The coverage of blocks and villages have been given below :

Area covered under National Demonstration Programme

S. No.	Name of blocks	No.of villages	Name of villages
1.	Chhindwara	15	Chhindwara (Pateleshwar), Puama, Chandangaon, Imlikhora, Umriya, Isra-Sukaludhana, Ramghadhi, Ghatparasia, Sarna, Bohta, Seoni, Pranmoti, (Lehgadua) Borgaon, Zari Nagzir.
2.	Mohkhed	8	Umaria, Agni, Ekalbihri Jam. Tansra, Las-khedi Amaziri.
3.	Parasia	8	Khirsadoh, Gajandoh, Umroth, Heti, Parasia, Newton Chikhli, Belgaon, Ankhawedi
4.	Chourai	11	Chorgaon, Sihoramal, Zilmili, Keria, Madkahandi, Udadaon, Navegaon, Chourai Seetapur, Dungaria, Ghorraiyya.
5.	Sausar	8	Khutama, Jam, Ramakona, Pipla, Narayanwar, Waghora, Borgaon Saoli.
6.	Tamia	7	Tamia, Bijori, Dhana, Khadua, Didholi, Chhindi Delakhori.
7.	Amarwara	6	Singodi, Khokra Chourai, Pindrai, Dabir Tendni, Chimang, Amarwara.

4 .10 National Demonstrations Programme

4 .10.1 During 1980-81 to 89-90, 680 National Demonstrations were organised, on various crops on 388 farmers fields adopted under National Demonstrations like soybean, jowar, maize, groundnut, potato, paddy, wheat, moong, frenchbean, gram, gilki, bhindi, lauki, karala, arhar. etc. Three crop rotation of soybean- wheat-lauki proved better than others giving the highest net profit of Rs.23,833/- per hact.area. Amongst two crop rotations soybean potato resulted in the highest net profit of Rs.14,428/- per hect are over others. In case of individual crops vegetable. Jowar, wheat-soybean and wheat crops could be grown more profitably. Technology of growing gram just after harvest of soybean (3-4 days) was introduced and has been popularised among farmers of the district.

4 .10.2 The striking results achieved from the National Demonstration over the past one decade have revealed that the yield of major cereal, pulse crops could be increased by two to three times from the existing level provided the recommended technology is adopted by farmers.

4 .11 Constraints Identified in conducting National Demonstration

4 .11.1 Technological : Farmers are not in a position to use costly insecticides sometimes due to poor financial position hance they may go for biological control of insect/pests but can not do so in absence of technological know how.

4 .11.2 Input supply : Due to poor financial position, small and marginal farmers can't efford for costly and quality seed (foundation/certified) balance use of fertilizers, insecticide/pesticide spray timely.

4 .11.3 Extension : Chhindwara being tribal district. The percentage of the educated persons is very low. They are economically poor orthodox and do not want to take risk. Hence the use of extension teaching methods could not serve the purpose to the desired level.

4 .11.4 Farmers level : Tremendous industrial development arised situation of short of field labour required for sowing harvesting and other operations. Similarly failure/short of electrical power supply creates obstacle in timely irrigation to field crops. Beside above they could not get bank loan for purchase of electric motor pump equipments due to lengthy procedure of loan advancement. They do not have suitable implement for sowing in lighter and shallow type of soil.

4 .12 Feed back given to Scientists and problems solved

(i) In case of Gram Crop, no wilt resistent variety is available these days. The problem was given to scientists of the J.N. Krishi Vishwa Vidyalaya, Jabalpur and they solved it by giving wilt tolerant variety of gram JG-315.

(ii) Jowar CSH-5 Seed needs to be replaced every year. This problem was solved by supplying composite variety of jowar SPV-741 and had been largely adopted by the farmers owing to its bold seed and good quality palatable fodder.

(iii) Earlier Farmers were growing low yielding varieties of sugarcane same was replaced by supplying Co. 1305 and 13 to adopted farmers under entire farming system demonstrations.

(iv) Shattering variety of soybean JS-2 has been replaced by JS 7[illegible]-44, due to its non shattering character and is widely adopted by farmers of the district.

(v) Low yielding varieties of wheat have been replaced by new high yielding varieties like WH-147 and lok-1, HI-617, N-195 and gram by JG-315, JG-74 and U-21.

(vi) There is no suitable implement for using as fertiliser cum seed drill in shallow lighter type of soil. The Scientists were made acquainted with this to develop suitable implements.

4.13 Technology Demonstrated

(i) Timely sowing of crops specially during kharif season.

(ii) Use of balance does of fertilisers on the basis of soil test keeping in view the soil type and crop requirement.

(iii) Sowing of wheat with iron dufan fertiliser-cum-seed drill instead of broadcasting.

(iv) Timely control of weeds through interculture operations adopted and use of 2,4-D (weedicide) to control broad leaved weeds in irrigated wheat at 35-40 days growth.

(v) Irrigation to wheat at critical stages of crop growth and providing one or two irrigations to gram for exploiting maximum potentiality to achieve optimum yields.

(vi) Adoption of timely control measures so as to keep insect, pests and diseases under check.

(vii) Use of culture specially in pulses and seed treatment chemicals to have better plant population.

(viii) Sowing of gram just after harvest of soybean within 3-4 days so as to take advantage of residual moisture for better germination and good yield.

(ix) In case of Zn-deficiency particularly for groundnut crop use of $ZnSO_4$ 25-50 kg/ha proved beneficial of farmers fields.

(x) Yield of Niger crop increased two to three times when demonstrated to farmers as timely and line sowing with minimum use of fertilisers.

(xi) Potentiality for taking up of kharif potato and onion were demonstrated in view of their higher prices fatched when produce reach to the market.

4 .14 Special Features

4 .14.1 It has been observed that timely sowing plays a key role in production of crop exploiting full potential of a particular variety during the crop season. It was recorded that in the year 1987-88 when the sowing of soybean was delayed by a week the yield was considerably reduced by 3-5 q/ha. Similar results were also noticed during the year 1988- 89. When it was done in 27 week it drastically reduced the yield by 5 q/ha. In most of the years 26 week was found to be suitable for sowing of kharif crops for attainting maximum yield.

4 .14.2 The yield of soybean in the district during the last 10 years was consistently higher than the state average. In fact during the period from 1980-81 to 86-87 except 1984-85. The yield of soybean was almost two three times higher than the district average. Nevertheless the lowest sustainable yield was achieved owing to lighter soil and early cessation of Monsoon rains required at the particular stage crop growth. This lowest sustainable yield seemed to be higher than the district average in some of the cases. Even in lighter soil the lowest sustainable yield was obtained with use of new technology, exploiting fall potential to the possible

extent and this was demonstrated through National demonstration on farmers fields.

4 .14.3 The striking results obtained from the National Demonstration over the past one decade have revealed that vegetables are more profitable but if pulses and cereals are grown by following proper technology more net profits are expected.

4 .15 Impact of Krishi Vigyan Kendra

4 .15.1 The Krishi Vigyan Kendra of Chhindwara has achieved a lot of success since its inception. The farmers trained in crop husbandry have shown good Impact on their crop yield under demonstration plots the yield increase was in various crops ranging from 100 to 175% over the district average yield, on cultivators field, The yield data table exhibits that in soybean the range of yield increase is upto 2 times, in maize it is 1-5 time, whereas wheat has shown 2.75 times more yield than the district average yield. The yield of Gram ranged 1.4 to 2.26 times. Further, there is an increase in the double cropped area in dry by way of taking Gram as a second crop in Rabi after soybean at zero tillage in medium to heavy black cotton soils. 15 days early sowing of Niger in line as against broad casting has raised its yield to 200%. It has proved a boon specially to tribal farmer who can only adopt zero cost input technology.

4 .15.2 The training to ladies in tailoring and knitting, fruit and vegetable preservation has definitely generated employment. It is visible as they have started their own business- construction and installation of smokeless chulha in villages so for 600 chulhas successfully have been installed in 10 villages, which has not only saved the fuel but also provided hygienic condition to family

members. Demonstration of energy saving equipments like solar cooker in rural and urban areas are getting popularity. 13 ladies and 6 girls who were imparted training have started their independent tailoring and knitting work. Similarly, atleast 20 girls have started preservation of squashes, Jam Jelly and sauce on independent-basis utilising the seasonal fruits available in the market.

4.15.3 Under Horticulture, the major impact is to encourage farm woman to raise vegetable crop saplings and kitchen gardening in their backyard tree seed samples of improved vegetable crops were also distributed, to encourage them in vegetable gardening.

4.15.4 As an experiment the 15 down troddon families provided improved birds with cage and feed. It has raised their economic condition and a good image in their society.

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CHAPTER-5

PLANNING AND IMPIEMENTATION SYSTEM

5 .1 State Planning Board

5 .1.1 In the state of Madhya Pradesh the State Planning Board (SPB) was constituted in 1972. The SPB is primarily concerned with preparation of State Five Year Plan and Annual Plans, advise the State Government on economic policy, conduct studies pertaining to the economy of the state and evaluate project proposals which costs more than 50 lakhs.

5 .1.2 In the Seventh Five Year Plan, the outlay provided was of the order of Rs.332.00 lakhs but the expenditure was Rs.4075.41 lakhs. The excess expenditure was incurred because the District Planning Machinery was created in all the 45 districts and provision for untied funds was made.

5 .1.3 The Eighth Plan, under the SPB, provisions have been made for the following schemes/progress of which details are given below.

Item	Eighth plan 1992-97 (Rs.in lakh)	Annual plan 1992-93 (Rs.in lakh)
1. State Planning Board including district planning machinery	948.00	220.00
2. Untied Fund district plan	51,925.00	7,200.00
3. Special Programmes	25,447.00	-
Total	78,320.00	7,420.00

5 .1.4 Since the major percentage of the untied funds is spent in the rural areas, it has been estimated that almost 97 per cent of the total outlay would be spent in rural areas.

5 .1.5 It has been estimated that during the Eighth Plan, employment to the tune of 865.42 lakh mandays and in the year 1992-93 about 120.00 lakh mandays would be generated.

5 .1.6 In the state of Madhya Pradesh the decentralize planning at the district level was initiated in the Seventh Five Year Plan and District Planning Board (DPB) were established in all the 45 districts of to formulate and implement the district level schemes prepared by the DPB.

5 .1.7 The process of decentralization in State Planning Board has been adequately extended by the distribution of funds grampanchayat wise and also allowing their participation in decision making and execution of schemes with the funds provided.

The District Planning Board, Chhindwara is consisted of a large number of members. They are as follows :

1.	Minister incharge of the district	.... Chairman
2.	All MLAs and MPs of the district	.... Members
3.	District Panchayat President	.... "
4.	All Janpad Panchayat President	.... "
5.	President of Cooperative Banks	.... "
6.	Seven Social Workers nominated by State Government	.... "

7.	District Level Officers of the various departments	....	Members
8.	Collector	....	Member Secretary
9.	DIstrict Planning Officer	....	Member Dy. Secretary

5.1.8 The DPB is a constituent of the office of the district Collector and works as District Secretariat for planning purpose. The Collector is the sole authority coordinating the all sided development activities including agriculture, of the district.

The DPB is also assisted by the executive committee which has the following set up.

1.	Collector	....	Chairman
2.	All Heads of the Department (District Level)	....	Members
3.	All Officers in-charge (Representative of lead bank, Manager, District Rural Bank, Cooperative Bank, IDB & MPEB)	....	Members
4.	District Planning Officer	....	Member Secretary

5.2 Functions of District Planning and Development Board

5.2.1 The functions of District Planning and Development Board are given below :-

(i) To collect the information about the availability and potential use of natural and human resources. To prepare schemes for annual and five year plans of the district.

(ii) To prepare specific schemes to be funded from the district sectorial plan under the decentralize district planning system and to ensure appropriate use of the fund alloted for a particular scheme.

(iii) To undertake a regular monitoring and evaluation of the district level schemes through feed baek mechanism.

(iv) To ensure maximum participation from govt.and Non-govt.organisations and local citizens.

(v) To coordinate between/among various departments at the district level and to have a vertical interaction between state and District Planning Boards.

5 .2.2 Similarly the executive committee has been formed to perform the following functions :-

(i) To monitor and evaluate the various schemes operating in the different departments funded by the District Planning and Development Board.

(ii) To discontinue a scheme if poorly managed or not satisfactory in terms of its performance. The Scheme may also be discontinued if there is any irregularity in the implementation of the scheme.

(iii) To provide published material, training and organize seminars about the various benefits of schemes of District Planning and Development Board.

(iv) To assist District Planning Board in preparation of schemes.

5 .3 Review of Existing Planning System

5 .3.1 With the establishment of DPB, the heads of the various departments at District level are responsible to prepare the appropriate schemes for seeking financial assistance from the DPB. The prepared schemes are reviewed by the members of the DPB before allocation of the fund. Once the scheme is approved, the head of the department at district level will be responsible to excute the project. There is enough flexibility provided in the planning process, Reprioritization of the schemes is based on the feedback analysis in terms of its tangible and in tangible benefits to the beneficiaries.

5 .3.2 The department wise allocation and expenditure position on agriculture and allied related sector programme prepared by DPB Chhindwara is presented in Annextures 6.1, 5 .2 and 5.3. This may be helpful as broad indication of the magnitude of effort made by DPB during Seventh Plan period. The effort involved, however, is massive. DPB has to play a key role in this. Therefore, efficient and well cordinated management and simplified procedure are preconditions for a rapid and extensive adoption of modern technology by farmers in this district. Further, this cannot be done on the cheap. It will need a minimum critical investment in agriculture and related sectors in Chhindwara district during Eighth Plan period.

5 .3.3 If this is not done, the capital starved farm sector of Chhindwara district will never be able to achieve the production potential that is capable of and the objective of converting this district into a new granary for the Madhya Pradesh and providing reasonable employment and food for the people which are the key elements in our strategy for development in district.

5.4 Agriculture and Allied Services

5.4.1 Some selected physical targets for the agriculture and allied services have been proposed to be achieved during Seventh Five Year Plan in the district plan of Chhindwara district. The details are presented in Annextures 6.4 and

The agriculture continues to play a predominent role in the economy of the district and socio-economic life of its people. The activities under the agriculture sector are managed through three segments namely (i) Agriculture, (ii) Horticulture and (iii) Farm Forestry. The target and achievements are based on the performance of the Seventh Five Year Plan (1985-90) and scenario of the district plan has been presented in above mentioned Annextures. Looking to the performance special foodgrain production programme/ schemes were started in the district. Similarly as an activity in the agriculture sector the importence of horticulture, veterinary and forest cannot be under estimated especially in the district like Chhindwara, without repeating that Chhindwara district population and that it is a backward district industrially. It can be appreciated that horticultural, vetarinary and forest activities will not only raise the nutritional standards of the rural population living below the poverty line in the district but will also encourage agro-based processing industries. In the Eighth plan period the agriculture sector will continue the schemes started by in the seventh plan since they have paid good dividends in the district plan of Chhindwara district.

5.5 Rural Development

5.5.1 The Rural Development Programme in Chhindwara district are being implemented through District Rural

Development Agencies. In the context of the recent decision of the State Govt. to decentralise the implementation of as many programme as possible, and the enactment of the new Panchayat Raj Act 1990, the implementation of Jawahar Rojgar Yojana (JRY) and Integrated Rural Development Programme (IRDP) has now been transferred to the panchayats. During the Seventh Plan the achievement in the major sectors of rural development have received top priority in the district.

5 .5.2 The new single employment programme of Jawahar Rojgar Yojana is being implemented by the Panchayats at grass roots and 27.50 lakh mandays were generated through the work taken up during the year 1989-90 in the district.

DEVELOPMENT ISSUES

5 .6 Agricultural Development in Tribal Areas of Chhindwara District

5 .6.1 In Chhindwara district tribals constitute a sizable proportion of the total population. Gonds are the most of the scheduled tribes of the district. Tribals living in rural areas of the district are primarily dependent on agriculture and forest produce. Evidently, agriculture is the main source of livelihood of most tribals. However, agriculture in tribal areas of the district is most under developed and backward. Consequently, productivity is very low. Development of agriculture is, therefore, important for improving the socio-economic conditions of tribal population in Chhindwara district.

5 .6.2 For accelerating the pace of socio-economic development of tribals, the Madhya Pradesh State Governments have formulated sub-plans in which priority has been given to agricultural development. However, the task of agricultural development in tribal areas is so complex and formidable that it needs imaginative and concerted effort and well designed thrust.

5 .7 Special Features of Tribal Areas

5 .7.1 In formulating a planning strategy for tribal areas, their special features must be recognised. They are mainly the following.

(i) Community Ownership of Resources : In tribal areas resources are mostly owned by the community as a whole. Hence, the decision on the use of available local resources is made by the community and not the individual.

(ii) Spectrum of Resources : The tribal economy is basically a subsistence economy, but reasonably well balanced. Unlike in the plains, it is more broad based on activities like forestry, horticulture, animal husbandry, cultivation of some staple crops.

(iii) Skill Spectrum : The skills of tribals cover a wide spectrum such as hunting, fruit-gathering, weaving, basket making, agriculture, etc. They are not highly specialised or sophisticated. However, the skills developed over centuries by tribals are suited to the particular environment in which they live. Given the traditional skills and aptitudes, the tribals are slow to accept new skills.

(iv) Traditional Institutions : The tribals attach great importance to their traditional values, morals and institutions. Most of them have an egalitarian ethos, with a great concern for their community. This is both a sociological constraint and an advantage a constraint because an individual oriented development programme will not be much appreciated and an advantage, because if the community could be involved in development, it will have the desired impact.

(v) Modern Institutional Constraints : The tribal areas are handicapped by inadequate modern institutional infrastructure. Even where new institutions have been established, they are not attuned to specific local situations, because of differences in perception between those who run the institutions and the tribals.

(vi) Extensive Resources and Limited Manpower : In contrast to the plains, where the man-land ratio is high, in most of the tribal areas the man land ratio is low. Therefore, the basic parameters of planning for the district economy as a whole (based on labour-surplus hypothesis) will not necessarily hold good for tribal areas, because they have limited man power relatively to natural resources, particularly forests.

5 .8 Major Constraints in Tribal Areas

5 .8.1 In tribal areas of the transitional type, most of the farmers are small and marginal and practise subsistance farming. In the absence of commercial out look and infrastructure, they have often no incentive to maximise

productivity. Irrigation facilities in these areas are extremely poor.

5 .8.2 In the absence of developed infrastructure like markets, Communications, etc. most of the tribal farmers do not get fair price for their produce. On the other hand, being simple folk, they are always exploited at every stage purchase of necessities, sale of their farm and forest produce, payment of wages, etc.

5 .8.3 Most of the tribal farmers cultivate their land under imput starved conditions, as they are poor and have little means available for production. Poverty of small and marginal tribal farmers limits not only their ability to make adequate investment but also makes them shy to approach financial institutions for credit. Consequently, tribals continue to depend on other sources of finance like local traders and big farmers who charge usurious rates of interest. Financial institutions need to modify their approach and procedures substantially and make them simpler to overcome this special problem of tribals. If these institutions need some assistance for this purpose that should be provided by the state government. The fact that tribals are usually very honest and particular about debt repayment should be given special consideration. Those who pay interest regularly, should be given adequate extension of time for repayment of principal, when needed. Usual penalties for default may be relaxed in the case of tribals.

5 .8.4 Improvement in productivity needs introduction of modern technology like use of improved seeds, fertilizers, implement etc. However, due to poverty and illiteracy, the tribal farmers are not in a position to make use of improved technology. Attempts to impose such technology on them without proper care may prove even counter-productive. The technology to be introduced must take into account their skill endowments as well as resources. There is, therefore, need for special adaptive research programmes in tribal areas which can adapt or develop suitable technology for use by the tribals.

5 .8.5 Forest are a key factor for tribal society. It is estimated that tribal people dwelling in forest areas obtain about 10 to 50 per cent of their income from minor forest produce. However, indiscriminate deforestation in certain areas has deprived the tribal people of this source of income. Consequently, their dependence on agricultural sector has further increased.

5 .8.6 Most of the tribals practise subsistence farming and harvest single crop. In many cases, the produce is not enough to meet their requirement for the whole year. In this situation, a large number of tribals migrate to other areas to avoid starvation. If some irrigation can be developed in the district, in addition to helping to protect kharif crops, it can also help raising a second crop which would provide the needed food and work to the tribal people.

5.9 Strategy for Agricultural Development in Tribal Villages of the Chhindwara district.

5.9.1 The agro-climatic conditions of tribal areas and socio-economic conditions of tribal communities vary from sub region to sub region in the district. It is therefore, necessary that local conditions should be given full consideration in formulating the strategy for agricultural development in tribal areas of the district.

5.9.2 In this context, two important factors, viz. (i) low-grade economy with scanty savings and (ii) low-skill, should be kept in view. As tribals are not able to take risks and are slow to assimilate new skills and attitudes within a short period, a step by step introduction of improved technology would show better results than massive introduction of modern technology. Use of non-monetary inputs in tribal areas should be encouraged.

5.9.3 For promotion of suitable technology in tribal areas adaptive research programmes in tribal areas should conduct regular field trails on various programmes such as 'Lab-to-Land' projects. The regional adaptive research stations should also act as a feedback channel from the field to the State level. Besides research, these stations can also undertake the function of field extension. In tribal areas, only the tested and tried programmes and practices should be introduced. Any failure can seriously impair the confidence of the tribal community in the change-agent.

5.9.4 It may not be possible to stop shifting cultivation altogether in the near future due to various reasons.

However, some steps can be taken to protect the soil from erosion. Tribals should be persuaded to plant some fruit trees on the bunds and not to burn or eat them at the time of shifting. Since tribals usually hold fruit trees as sacred, this should not be difficult. It would help reduce soil erosion and improve water harvesting. This would also improve land fertility over a period.

5 .9.5 In tribal villages of the district, the area under irrigation is negligible. Therefore, more emphasis should be put on dry farming practices. However, due to outdated farm practices and lack of suitable seed varieties, the yield is very low. Improvement in dry farming practices in unirrigated villages as well as development of suitable varieties would help boost production and productivity.

5 .9.6 Micro watershed development would show good results in many tribal villages in the district and should be given high priority.

5 .9.7 Development of irrigation facilities in tribal areas would improve crop intensity. Therefore, high priority should be accorded to minor irrigation in any programme of the district for tribal development.

5 .9.8 The community organisations of the tribals should be adapted or a special cooperative society should be organised, comprising the beneficiaries of a micro-watershed development project or command area of an irrigation pipe outlet, to ensure optimum results.

5..9.9 In command areas of surface irrigation projects, many tribals are not able to avail of benefit from the projects because their lands are not developed or they are not in a position to invest on construction of field channels, etc. They are also not fully aware of the appropriate agricultural technology. It is, therefore, necessary that land shaping and development should form an integral part of irrigation projects in tribal villages and should be taken up by the Madhya Pradesh State Government.

5..9.10 For making full use of irrigation facilities in tribal villages much more intensive extension support is necessary than in other villages of the district.

5 .9.11 In marginal and sub marginal lands and villages affected by acute soil erosion, soil fertility is very low. In these villages fruit, fodder, fuel and medicinal plants be grown to provide better avenues of income to the tribals. Some of the poorer villages now put under very low yielding millets. Tribals are not merely fruit collectors, but are also good at taking care of trees. Therefore, horticulture development programmes with adequate extention and marketing support can be very successful in the district.

5 .9.12 While developing fruit and vegetable cultivation in tribal villages a standard commercial varieties should be encouraged in each Compact sub-region of the district. This would facilitate marketing. If different farmers grow different varieties of fruits or vegetables and each produces only one head load, they may not be able to get the best price

for their produce. The aim should be to produce at least one lorry load on each market day from one compact sub-region so that not only transport cost is reduced but also the produce can be taken to an alternative market if the traders in the nearest market try to depress the prices Cooperative Marketing Federation can also provide some alternative to traders.

5 .10 Allied Activities

5 .10.1 In some tribal villages there is good scope for poultry piggery, rearing rabbits, goatry, cattle and sheep rearing, pisciculture, sericulture and apiculture. Tribals seem to prefer meat animals to milk animals which needs to be kept in view. Development of these and allied activities would help to improve the socio-economic conditions of tribals in the district. These activities would be quite successful in the hinterland of industrial and mining complexes and in villages with good road connections to urban Centres of the district. The tribal should be offered a 'package deal', i.e. supply of basic inputs, transport, storage and marketing facilities. Artificial insemination of local breeds with a view to suitable upgrading of the cattle needs to be given much higher priority than at present.

5 .11 Role of Women

5 .11.1 Women play an important role in tribal villages of the district. But the usual training programmes are addressed to men who may not be taking some of the crucial decisions. Women need to be drawn in a significant way in training programmes for tribal villages of the district.

5 .12 Credit

5 .12.1 Increased flow of institutional credit is one of the most important inputs required for improving agricultural productivity in the district. Tribals should be persuaded to take advantage of credit.

5 .12.2 Institutional credit should be provided mainly for viable projects. For small and marginal tribal farmers, schemes which generate additional income within a short period should be given priority. This would not undully increase the repayment burden on tribals.

5 .13 Marketing

5 .13.1 For facilitating the marketing of farm and/or forest produce, the development of infrastructure like roads and transportation system is essential. Most of the tribals still carry the produce on head loads. Institutional credit for purchase of a bullock cart or cycle rickshaw can reduce this drudgery. Madhya Pradesh Government should give adequate subsidy for this purpose in tribal areas of the district. Banks should also provide credit for vehicles to Cooperative societies for transport of farm/forest produce to the different markets within the district.

5 .13.2 So far most of the tribals have been involved only in the collection of minor forest produce. Any value addition to forest produce can increase the income of tribal people considerably. Tribals can take up the extraction of oil from sal, kusum, karanji, neem and various other seeds. Similarly, instead of selling of bidi tendu leaves tribals

should be engaged in rolling them. Similarly, tribals can be trained in processing some other produce like lac, gum etc. The processing of forest produce would not only provide employment to tribals, but it would also utilise the services of women and children in their traditional habitate. Similarly, small industries base on raw materials available in the forest and tribal areas should be developed nearer to these areas which can provide employment to tribals, particularly during the lean season.

5 .14 Social and Farm Forestry

5 .14.1 Forest are an important part of tribal life. Most of the tribals, particularly primitive and backward groups, are largely dependent on forests for their various requirements. They get food, fodder, fuel, manure, timber and oils from forests. Besides these, forests are an important source of pulp. The country is experiencing a shortage of pulp and the paper industry is hardly able to utilise two-thirds of its capacity. Therefore, forest development is very important from tribal as well as state point of view.

5 .14.2 There is need for special radio, television and video casette programmes dealing with the problems faced by the tribals in agriculture and related subjects. These may be designed by units specially set up for the purpose and disseminated through community sets.

5 .14.3 It will be useful if atleast once every year officers of agriculture, horticulture, animal husbandry, irrigation and drainage, transport and cooperative departments meet the

knowledgeable representatives of the tribals in the district in a seminar to discuss freely and frankly the problems faced solutions tried and results obtained. Proceedings of such seminars should be given careful consideration by all the concerned authorities at State Government levels.

5..15 Flexibility in Planning and Implementation

5 .15.1 Flexibility in planning and implementation, which may require a modification of a programme introduced on the basis of experience, is essential. In view of the fact that the community wields considerable influence in tribal villages it should be motivated to take up development, with Madhya Pradesh Government support, wherever necessary.

5 .15.2 Finally, the degree of success in tribal development depends upon the extent to which the tribals are involved in the formulation and implementation of programmes.

5 .15.3 Development of the right type of human relationship is the key to the development of the tribals. Mere technological and economic approaches would not be enough. These are necessary but must be supplemented by anthropological and socio-psychological approach. State Government Agencies, voluntary organizations and research institutes should collaborate closely towards this end.

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CHAPTER 6

POLICY MEASURES FOR ACCELERATING AGRICULTURAL DEVELOPMENT

The major constraints impending agricultural development in the sub-regions of the district are given in preceding chapter. In this Chapter, the strategy to overcome the constraints and accelerate the process of agricultural development is set out. The main components of this strategy are in the spheres of land policy, irrigation, drainage and water management, mechanization of farm operations, input supply, research, extension and training, ancillary activities and transport and marketing arrangement etc. These policy measures are more or less common to all the three sub-regions in the district as a whole.

6 .1 Land Policy

The basic constraints to improve productivity is the small size and fragmented nature of holdings. Consolidation of holdings, particularly in irrigated areas as well as areas having good ground-water potential, needs to be given high priority. This should be implemented in a phased manner, so as to complete the entire operation by the end of Eighth Plan. Specific allocations for this should be made in state Plans.

6 .2 Irrigation and Water Management

Water is the most important input for agriculture. The erratic nature of mansoon during critical periods of plant growth affects productivity adversely. Therefore, the major thrust of development strategy for the district has to be in the sphere of irrigation, drainage, water management watershed development. Major suggestions in this regard are set out below:

(i) In compact areas a battery of tubewells and pumpsets, either electric or diesel, may be installed. This will serve a dual purpose provide irrigation and take out excess water during kharif.

(ii) For electric pumpset in compact areas, uniterrupted power supply for at least 8 hours a day has to be ensured.

(iii) In unelectrified villages where uncertainty of power supply is a persisting problem, farmers should be encouraged to go in for diesel pumps. The State Government should, however, take necessary steps to ensure regular supply of diesel to farmers. As the diesel pumps can be easily transported, pumpset owners particularly small farmers, should be encouraged to hire out pumpsets to other farmers. This would provide additional income to pumpset owners and at the same time other farmers will be able to get benefit without capital investment.

(iv) For encouraging use of diesel pumpsets, oil companies should set up properly equipped diesel sale and service stations in rural areas on a 'franchise' basis, on the model of what they are doing now for petrol sale and servicing stations in urban areas. Such arrangements are particularly needed in dry sub-region of district.

(v) Tubewells and electric/diesel pumpset may be owned or leased or operated by (a) individuals Farmers' Group/ Associations, (b) Public sector agencies or (c) private sector enterprises.

(vi) The ownership of tubewells and pumpsets may prove onerous for small and marginal farmers. Therefore, setting up of leasing companies to provide pumpsets on lease basis should be encouraged in each block. This should be operated on a competitive basis. Monopoly by any one agency should be avoided.

(vii) The tribals should purchase the pumpsets or hire from leasing agencies. Credit institutions should provide the necessary loan facilities for this purpose.

(viii) The prevailing water rates may be reviewed and restructured. Restructuring of water rates may be done on the basis of hours of supply or volume of water released. State Government may also consider the introduction of differential rates- a basic rate for the kharif season and the basic plus additional rate for the rabi season. These rates may be fixed per acre inch of water supplied or on crop basis.

(ix) Release of water and closure of canals should be timed according to the requirements of crops and weather conditions. The State Irrigation and Agriculture Departments should have closure coordination for this purpose.

(x) At present, irrigation is available only 8 per cent of net sown area of the district. It is, therefore, necessary to undertake an integrated programme of water harvesting, water management, lift irrigation and contour bunding.

(xi) Micro-watershed development and agro-forestry have to be accorded special priority in the sub-regions of the district.

(xii) Measures should be taken for maximum utilisation of irrigation in sub-regions of the district. Farmers should be educated about the benefits of on-farm development like construction of field channels, drainage, etc., as well as economy in use of irrigation water.

6 .3 Crop Planning

Steps should be taken for contingency planning in the sub-regions of district against uncertainty of rainfall. On the basis of rainfall data, contingency plans should be prepared sub-region-wise.

In sub-regions where rainfall is inadequate and erratic farmers should be persuaded to mix with or subsitute rice by low duty crops like millets, pulses etc. Similarly, in sub-region where irrigation during rabi is limited, efforts should be made to economise water by giving preference to wheat.

Use of marginal and sub-marginal lands for cultivation of rice should be discouraged. In such sub-regions, course grains and fodder crops should be promoted instead.

Small and marginal farmers should be encouraged to go for mixed farming.

The State Government should encourage community nurseries to ensure early sowing of paddy. This will save the crop from the effects of delayed and erratic rainfall.

Regional Agricultural Research Station located in Chhindwara should evolve suitable cropping pattern based on rainfall, soil and agro-climatic conditions of the sub-regions in the district.

Soil erosion should be checked through afforestation, contour bunding, contour ploughing and other soil conservation methods.

There are crops that could give farmers something in return for this effort even in unfavourable years. These are fodder crops. Mixed cropping system comes into full play in this situation. If one crop fails, another comes to the rescue of the farmers. It is important to treat all practices as a package because it is the cumulative effect that enables a farmer to raise crops successfully in rainfed areas. It is needless to say that partial adoption of this package will not produce the desired result. This is the task which the State Agricultural Department in these sub-regions of district must take up in right earnest and gear up the extension machinery as well as the input supply organisation towards this end. It requires a close and coordinated effort on the part of the various agencies involved in introducing this package approach and all have to work together as per a preconceived cropping programme, based on proper land use pattern.

Despite the technology being available and its economic feasibility established, still the farmers are not changing over to new pattern. The trouble is that every household is anxious to somehow produce sufficient foodgrains of the varieties most prevalent in the sub-regions of district. The basic fear dominating the farm population is the possibility of drought and famine, forcing it to produce as much as he can do not only to meet his current consumption, but also for a carry-over for the next year when the food crops may fail. If the farm population is to be brought out of this fear complex and persuaded to change the present pattern of land use, there must be some guarantee that they must get their

food requirements throughout the year at a resonable price and the type of food required by them from nearby fair price shop. The district with its distributing organisations should now be in a position to give this guarantee provided the requirements are estimated in detail at the block level, adjusting the requirements to the changes in cropping pattern that have taken place and providing necessary foodgrains throughout the season at nearby fair price shops. This is the first essential and foremost support for a proper land use strategy in the Eighth Five Year Plan.

6 .4 Public Distribution

The public distribution system needs to be exterded particularly to the tribal/backward sub-regions of district identified for production of specific high value crops. Only if there is an assurance by the public distribution system that adequate supplies of foodgrains at reasonable prices will be available, the small/marginal farmer will consider shifting from traditional foodgrain crops to high value crops. Extension effort and technology alone will not bring about such a transformation.

6 .5 Horticultural Development

Horticultural development in sub-regions of district has, by and large, been unbalanced and lopsided. It constitutes some important sub-sectors- production and post harvest handling including marketing and processing. Though the production aspect is better developed than others, it needs to be strengthened to increase productivity per unit with sub-region in district to cater to the ever increasing population.

Some of the suggestions to boost the growth of horticulture within sub-regions of district are :

(i) Horticultural development needs a strong research backup in all the four major constitutents of this industry and dissemination of information from laboratory to land to give a boost to scientific development of horticulture.

(ii) Collection of reliable data on area and production of all the horticultural crops for effective planning of production, marketing and processing, should be strengthened.

(iii) Effective steps for implementation of the nursery registration/certification regulations, supply of genuine planting materials and genotypes and popularising high density concept need to be taken.

(iv) Emphasis should be given to increase the productivity by modern technology and inputs.

(v) Since the losses of fresh fruits and vegetables take place at the level one third between farm and road head, another one third between road head and consumer, training of growers is necessary. The most important points are : pre and post-harvest handling, use of scientifically designed small capacity containers and application of low temperature and high relative humidity which can reduce the losses by 70-80 per cent.

(vi) Strengthening post-harvest management by setting up horticulture grower's cooperative marketing societies needs priority.

(vii) Credit facilities at concessional rates to extend the area under horticultural crops and utilising wastelands to some extent should be made available.

(viii) It is necessary to carry out the production programmes in concert with the National Rural Development Programme, the Integrated Rural Development Programme and the Rural Labour Employment Guarantee Programme in addition to the integrated and balanced development of horticulture within the sub-region of district.

6.6 Development, Strategy for Small and Marginal farmers

In the case of small and marginal farmers, a significant improvement in their income cannot be brought about merely by growing staple crops. In small farms with assured irrigation and having access to motorable roads to marketing centres, farmers should be encouraged to raise on a part of their holdings, high value crop such as vegetables fruits and/or HYV of staple crops. The area devoted to high value crops can be increased step by step. This will improve their income from farming operations.

Along with cultivation of high value crops, marginal and small farmers should be encouraged to take up ancillary activities such as animal husbandry etc.

6.7 Farm Machinery and Implements

For improving efficiency of labour, use of modern, but less expensive farm machinery and implements (manually operated water lifts, seed-cum-fertilizer drills, hand sprayers, improved ploughs, winnowers, paddle threshers, wheel hoes and paddy weeders etc.) should be encouraged.

6.8 Input Supply

(i) Seeds : The district is experiencing shortage of HYV/ improved seeds. The J.N. Agricultural University and Regional

Agriculture Research Station have been evolving varieties suitable for different agro-climatic sub-regions in the district. Steps should be taken for multiplication of those varieties. In the case of seeds of crops the state Government should ensure quality as well as timely supply. Seed storage and distribution centres should be set up preferably at Panchayat level, but not necessarily by the Government alone.

(ii) Fertilisers : For improvement of fertilizer consumption in kharif season, new practices such as placing fertilizer below seeds through use of seed drills etc. should be popularised which would reduce the loss of fertilizers on account of heavy rains.

Distribution network needs to be strengthened, particularly in interior areas. Steps should be taken to cover every Panchayat by a distribution centre by the end of the Eighth Five-Year Plan.

(iii) Pesticides : The pest surveillance units need to be [illegible] strengthened. Farmers should be educated about demage to crops from pests and diseases and measures for controlling them. Facility for hiring of pest control equipment like sprayers etc., should be provided to farmers. The State Government should also check the quality of pesticides sold by private traders to prevent adulteration.

6 .9 Rural Industry Centres

Adequate employment opportunities have to be created in the sub-regions of district in the non-farm sector for reducing pressure on land. This calls for effective linkage between agricultural and non-agricultural sectors, through a planned development of marketing and processing units in the secondary markets and other potential growth centres.

6 .10 Marketing

As distrees sales take place during years of bumper crop, arrangements should be made to siphon off excess produce during years of glut. Procurement agencies should help farmers realise remunerative price for their produce. Therefore these agencies should play a very active role in procurement.

6 .11 Transport

The road infrastructure should be considerably strengthened in the district so that it links not only villages to each other but also with market centres and towns. The need for such strengthening is particularly felt in isolated sub-regions of the district generally inhabited by tribals. Such a link-up, as also development of suitable transport vehicles, is an essential pre-requisite for effective marketing in sub-regions of district.

6 .12 Storage

Special measures are necessary to build up storage capacity for use of farmers. Such measures should be accompanied by simplification of procedure for credit delivery to them against hypothication of their stocks.

6 .13 Perishables and Semi-perishable Commodities

In sub regions growing mainly vegetables, fruits and potatoe adequate cold storages facilities should be provided. The cold storage would also be useful for storing milk and poultry products.

6 .14 Farm Price Policy

For substantial improvements in agricultural production and productivity, farmers must be ensured remunerative prices for their produce through an appropriate price policy in respect of farm

produce and inputs. The price policy should have a crucial bearing on farmers' income and intensification of adoption of improved technology, increased production, and rural capital formation. The policy in the Eighth Plan should be formulated, taking these factors into consideration and, in particular, will seek to protect farmers from wide price fluctuations, ensuring that the price which they receive will leave an adequate margin over cost. Efforts should be made to maintain prices at levels which increase efficiency of resource use and to improve the terms of trade in favour of farmers and to ensure this farm price policies should not be biased against agricultural producers.

15 Needs of Resource- Poor Farmers

Special care needs to be taken to ensure that the research and extension staff work closely with representative groups of "resource- poor farmers' in particular and not merely for farmers in general as hitherto. Otherwise, research and extension are likely to have a built-in bias in favour of "resource-rich farmers" whose conditions have similarity with those obtaining in experimental farms. If this has to be avoided, the basic problems of the target group of farmers should be first discussed with them, therefore research effort should be specifically focussed on these and the results discussed once again with the target group. Socio-economic aspects of the problems faced by the target group should receive no less attention than the technological aspects. In all these, the research and extension staff have as much to learn from farmers as the farmers have to learn from them.

Attention should be given to a number of important priority of research relevant for sub-regions in the district. Some of these are :-

(i) Soil water management in rainfed areas including study of ran-off problems. Research should be done on smaller models on the Regional Agricultural Research Station, Chhindwara to be translated later in bigger watersheds in farmer's fields.

(ii) Development of suitable cropping sequence and pattern in command areas to increase the efficiency of water utilisation.

(iii) Improvement of crop production practices especially in rainfed areas so that risk factors are minimised and farmers are encouraged to invest on impacts especially fertilizers.

(iv) Identification of suitable sources of resistance for pest and diseases; attention should also be paid to agronomic and cultural practices to reduce crop losses due to pests and diseases.

(v) Research on hand operated tools and animal drawn implements for preparatory cultivation, seeding and inter-cultivation should be developed.

(vi) Research on substitution of existing un-economic crops with more remunerative ones within the sub-regions of the district.

(vii) Introduction of soybean in both kharif and rabi and substitution of black soybean with high yielding yellow ones.

(viii) Research support for seed production through establishment of seed technology laboratory.

(ix) Socio-economic studies to analise constraints in adoption of Modern technology by various socio-economic groups especially tribals in the sub regions.

(x) Development of different crop varieties with emphasis on pest and disease resistence. Consumer acceptance and suitability to grow under the conditions obtaining in the farmer's fields.

(xi) Internsification of research on horticultural crops and important economic in all the three sub regions of district.

(xii) Research on high value conventional feeds and fodders with emphasis to utilise crop by products.

6 .16 Government Functionaries

For covering the large mass of rural population, Government functionaries have necessarily to play a leading role. This would call for a substantial improvement in management and organization. The administrative departments and agencies involved in the management of various programmes should be reoriented and geared to accomplish the developmental goals. The personnel at all the four tiers- State, district, block and village levels- should be more sensitive to the socio- economic objectives of development, especially in backward, remote, hilly and tribal sub-regions of district. Greater attention should be paid to (i) eliminating inefficiency, inertia and avoidable wastage of scarce resources and (ii) promoting, motivation and enthusiasm for implementing programmes. There must be better co-ordination among the various departments. The programmes should be vigorously and efficiently implemented and monitored.

This task of staping up agricultural production to the local commensurate with population growth is stupendous and hence government departments, voluntary agencies and farmers' organisations have to put their shoulders to this giant wheel to make it moving and moving fast. In order to achieve this objective, it would be desirable if the jurisdiction of important functionaries of government departments is delineated in accordance with the boundaries of agro-climatic sub-regions of the district. This would mean redrawing of the boundaries within the districts to be co-terminus with those of agro-climatic sub-regions. This way a full fledged team of functionaries will march in step to win righteous war on hunger.

6 '.17 Altitudinal Changes

The officials in-charge of district administration should be exhorted to be sensitive to the needs and aspirations of farmers particularly the weaker sections. The conventional bureaueratic approach, which has often resulted in mismanagement should be changed to a more flexible and development oriented approach to all problems affecting the rural community. Greater flexibility and decision- making at block level should be encouraged. The policies and procedure should be so designed as to meet the felt and emerging needs of farmers, especially the resource poor among them. The basic approach should be work with the farmers than just to work for them. Sound human relations and effective two-way exchange of experience should be given high priority.

It is better management at district and block levels which can do more for progressive improvement of agricultural productivity in sub-regions of district than anything else, especially now

that these sub-regions of district are almost near the threshold of rapid technological progress.

6 .18 Accurate Land Records Crucial for Rural Development Programmes

Accurate land records are a powerful means for furthering social justice in rural society and for implementation of rural development programmes. They pave way for right identification of beneficiaries for the implementation of various rural development programmes. In their absence, the whole end-purpose of the welfare measures may get jeopardised, if not defeated altogether.

Updated and accurate land records were crucial for effective implementation of land reform measures particularly for implementation of ceiling laws and for ensuring security of tenure of tenants and share-croppers. They also constituted a critical pre-requisite for the planning and implementation of rural development programmes. Land records were important for afforestation, social forestry and environmental restoration programmes that depended on the identification and demarcation of wastelands, village common lands and degraded lands.

Besides these, correct land records were also important for a variety of purposes like provision of agricultural credit, distribution of fertilisers to small and marginal farmers, crop insurance, food procurement etc. Accuracy of land records was necessary for agricultural census and statistics to become reliable. Thus, the basic land records and statistics had not only to be collected accurately but also needed to be uptodated periodically in the sub-regions of district.

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CHAPTER 7

SUMMARY AND CONCLUSIONS

7.1 Objectives :

(i) To review the organisational structure and methodology adopted for decentralised planning at the district level in Madhya Pradesh.

(ii) To prepare the profile of natural and human resources with focus on delineating agro-climatic regions in the district.

(iii) To highlight various schemes launched in the district, their implementation and problems.

(iv) To identify the constraints in agricultural and rural development.

(v) To suggest the strategy for future development.

7.2 Selection of the District :

For this study Chhindwara district has been selected. It represents typical crop combinations of the state and has significant area under horticultural crops. It has also significant tribal population. The district has 11 blocks and has been divided into three agro-climatic sub regions.

7.3 Data Collection :

Secondary data on various aspects of agriculture and allied occupations, demography etc. was collected block-wise from the official records and publications as noted below.

(i) "Agricultural Statistics", Directorate of Agriculture, M.P. Bhopal.

(ii) Department of Land Records, Chhindwara (M.P.) through the office of the Deputy Director of Land Records, Jabalpur (M.P.)

(iii) "Appraisal Report for strengthening Agricultural Research in Satpura Plateau (Zone No.IX) of J.N. Krishi Vishwa Vidyalaya, Jabalpur" Indian Council of Agricultural Research, New Delhi.

(iv) "Prospective Plan for 2000 A.D. of J.N.K.V.V. Jabalpur" Directorate of Research Services, J.N. Krishi Vishwa Vidyalaya, Jabalpur.

(v) "Status Report of Satpura Plateau Region" Regional Agriculture Research Station, J.N.K.V.V. Chhindwara, (M.P.)

(vi) "A Decade of National Demonstrations Project in Chhindwara District, Year 1980-90", Krishi Vigyan Kendra, Zonal Agricultural Research Station, JNKVV Chhindwara (M.P.)

7.4 The State and Selected District :

7.4.1 Madhya Pradesh State.

Madhya Pradesh (M.P.) is situated in the heart of India between latitudes 17°-26°N and longitudes 74°-84°E. It is the largest State of Indian Union, with a total geographical area of 443 lakh hectares. In terms of population (52.1 millions, 1981 Census), it occupies fifth position in India.

It is predominantly an agrarian State, agriculture employing about 80 per cent of the work force. It's vast size presents an extensive array of agricultural situation.

The main soil types found in Madhya Pradesh are alluvial, deep black, medium black, shallow black, mixed red and black, mixed red and yellow and skeletal soils.

The annual rainfall received by the state varies from 1600 m.m. in the eastern district to 800 mm. in the northern and western regions, with an average of 1142.6 m.m. In some years, rainfall goes such below the normal. Most of the rainfall is received in the monsoon period from June to September.

In normal years, the total amount of rainfall received in different parts of the State is adequate for growth of most of the crops. In some parts, it is even quite high and favourable to the growth of crops like rice and sugarcane. There is however, wide variation in the distribution of rainfall which leads to instability in productivity and production.

7.4.2 Chhindwara district :

The district Chhindwara has a total geographical area of 11,652 sq.km. with 10th position contributing 2.67% area of the state. Out of the total area ~~448~~ 558 lakh hectare is under cultivation. 4.10 lakh hectare is cultivated in kharif (80%) and 1.3 lakh hectare in Rabi season, respectively. The district has 10.7% irrigated area mainly through wells (86.7%) followed by canal and tanks. The average size of holding in the district is 3.4 against 2.9 hectare of state average of the total operational holdings the marginal (below 1 hectare) and small (1-2 hectare) constitute 25.63 and 21.49% respectively.

The principal crops grown in the district in kharif are kodo-kutki, jowar, maize, soybean, niger, groundnut, cotton, moong urid, arhar and wheat, gram lentil, peas are grown in rabi season.

Vegetable crops are grown thoughout the year in the district besides oranges for which it is famous.

Among the rabi cereals wheat is the important crop with a coverage only next to the most important kharif cereal i.e. jowar. Among oilseeds soybean has the largest coverage. Wheat contributes 98.23% to the rabi cereal production and 70.71 to the total rabi foodgrain production. It contributes 36.63% to the total cereal production and 27.53% to the total food grain production of the district. The productivity of soybean in the district is always higher than its average productivity in Madhya Pradesh. In fact out of 45 districts in Madhya Pradesh the highest yield of soybean during the last five years has been from Chhindwara district.

The district has total population of 12,32,735 of which 78.82% is rural comprising 56.32% of tribals with 28.2% literacy and density of population 104 per square km. Total farmers in the district are 2,33,600 of which 36% small and marginal ones.

Soils : The black soils of the plateau are well suited for wheat and gram. The best wheat tract of the plateau is its south eastern portion. The north eastern part of the plateau is also black soil tract but it is cut frequently by hills which are suitable for millets only. The south and western portion has yellow soils. The rest of west portion is suited for kharif crops mostly millets. The higher plateau in the north also grow kharif crop chiefly the kodo, kutki, niger.

Soils are generally low in available nitrogen and low to medium in phosphorus and medium to high in potash. The soils of the hilly tracts are almost eroded and are poor in water holding capacity. The shallow black soils in plains have better fertility as well as good water holding capacity.

Climate and Agricultural Situations of the District:

District Chhindwara is having comparatively mild climate. In terms of climatic variation, year can be divided into 4 district seasons; viz. cold season from December to February, summer season from March to middle of June or retreating monsoon season from Oct. to November. Based on the data maintained in 6 rainguage stations in this district the average annual rainfall comes to be 1269 m.m. varying from 1035.3 m.m. at Sausar to 1823.6 m.m. at Tamia. The average number of rainy days comes to be by (with rainfall 2.5 m.m. or more) varying from 59 at Sausar, to 73 at Harai Tamia. Based on 50 years of data the lowest annual rainfall (56% of the normal) occurred in 1902 and highest (143% of the normal) in 1950. The rainfall generally increases from west to east. The temperature increases rapidly in early March. May being the hottest month with mean daily maximum temperature as 39.4°C and minimum 26.1°C. By the middle of June the temperature drops appreciably with onset of monsoon, which after a slight increase at the end of September of early October decreases rapidly. January is the coldest month with maximum and minimum temperature as 25.5°C and 10.6°C, respectively. Due to cold wave the minimum temperature may drop down to about 3°C. The relative humidity which generally exceeds 70% during the south west monsoon decreases in the post monsoon season the driest part of the year being summer with relative humidity less than 25% in the afternoon.

7.5 Profile of Sub-Regions

The land topography of Chhindwara district is typical and quite different from rest of districts in Madhya Pradesh, being cludded ranges of Satpura mountain, it is predominantly slopy in

nature with very small percentage of area under level lands. The slope ranges from 1-2% to as steep as 80% and above the soils of the district ranges from sandy to clayay. Mostly three types of soils are found in the district.

1. Light reddish brown up land soils
2. Yellow and silty loam soils
3. Shallow black or clayay loam soils

On the basis of these soils the district was divided into following three sub-regions.

1. High ranges of Satpura
2. Plateau of Satpura
3. Plains of Satpura

High ranges of Satpura : This situation is characterised by high mountains of Satpura with an elevation ranging from 200 to 1000 metres above mean sea level. Rainfall in this situation varies from 1200 to 1400 m.m. This is predominantly mono kharif area. It includes the following three tribal blocks of Chhindwara district.

District	Blocks
Chhindwara	1. Junnardeo
	2. Tamia
	3. Harrai

Plateau of Satpura : This agro-ecological situation is the largest in area having moderate slope embadded with hillocks and rocks. The elevation of this location is 400-800 meters above mean sea level. Soils are shallow black, loamy clay, red loam and loamy.

The Plateau of Satpura consists of the following six blocks of the District.

District	Blocks
Chhindwara	1. Marwara
	2. Chourai
	3. Bichhua
	4. Mohkhed
	5. Chhindwara
	6. Parasia

Plains of Plateau : The topography of this sub-region is predominantly plain with scattered small hillocks. Soils of this sub-region are black and clayay loam, ill drained, heavy textured and low in fertility, but are of high yield potential if properly managed. These soils have high retentivity of water. In this sub-region irrigation is very limited, mostly through wells and utilized in orchards and wheat fields, Rainfall varies from 800-1000 m.m.

This sub-region includes two blocks of southern Chhindwara which are as below.

District	Blocks
Chhindwara	1. Sausar
	2. Pandhurna

7.6 Sub-Regionalisation :

Based on physical conditions, topography, rainfall, soil types, cropping pattern, development of irrigation the Chhindwara district is divided in to three sub-regions. A sub-region comprised of a number of Development Blocks.

Distribution of bloc - in the sub-regions of Chhindwara district

Sub-Regions	Block included	Tahsil
I. High ranges of Satpura	i) Junnardeo	Junnardeo
	ii) Tamia	Tamia
	iii) Harrai	Amarwara
II. Plateau of Satpura	i) Amarwara	Amarwara
	ii) Chourai	Amarwara
	iii) Bichhua	Sausar
	iv) Mohkhed	Chhindwara
	v) Chhindwara	Chhindwara
	vi) Parasia	Parasia
III. Plains of Satpura	i) Sausar	Sausar
	ii) Pandhurna	Pandhurna

7.7 Main Constraints in Agricultural and Rural Development in Sub-Regions of the Selected District

The performance of agriculture in all the three sub-regions of the district, especially in foodgrains production during the last decade has been sluggish. Foodgrain production has not kept pace with the population growth. As a result, the district is deficient in food supply. Given the expected increase in population the demand for foodgrain will considerably outstrip the supply, if the current production trends are not improved.

The Sheer need to increase food production to meet the requirements of its growing population calls for special efforts to improve production. As there is no further scope for expansion in area, such improvements in production can be accomplished only

through double and multiple cropping and stepping up yields in the sub-regions of the district.

7.7.1 Specific Constraints Identified in Sub-Region-I

i) Soils are marginal and sub-marginal with very poor soil depth and poor moisture retentivity.

ii) Soils are low in nutrient content.

iii) These soils are problematic from the management point of view as these soils become soft when it rains and become hard when dry.

iv) This is predominantly monocrop area.

v) Agricultural occupation is confined only for four months.

vi) Irrigation facilities are not available.

Vii) Only kodo-kutki and niger crops are grown which are very low yielding (180 kg/ha of kodo-kutki and 160 kg/ha of Niger)

viii) The tribal cultivators of this sub-region are very poor.

7.7.2 Specific Constraints Identified in Sub-Region-II

i) This sub-region includes various type of soil from sandy on hillocks for silty black on clayey silt at their basement. It therefore includes various problems of soil management. Hillocks soils are well drained with poor retension of moisture. These soil became readily workable immediately after rains/ irrigation, while they become hard and unworkable with loss of moisture. Crops start showing sign of

wilting within 5-7 days after rains. Temporary wilting of almost all the crops is most predominant feature when they are at productive stage specially with failure of late monsoon.

ii) Soils of this situation are low in fertility.

iii) Mostly late maturing low yielding local varieties of Jowar are grown by the farmers, which suffer due to failure of late monsoon.

iv) During 1982-85 the local Jowar has been partially replaced by hybrid Jowar but has poor fodder quality.

v) In maize also similar is problem, farmers are growing advanced generation of maize hybrids.

vi) Wheat is grown under heavy (10-15) irrigation in light red laterite soils, which is wastage of irrigation water.

vii) Wheat is sown by broadcasting of heavy seed rate and then applying heavy irrigation, leading to lodging and low yields.

viii) Late maturing varieties of Arhar are grown in light soils which suffer due to wilting in the early stage and moisture stress at flowering and pod filliry stage.

ix) Yield levels of urad are very low mainly due to local varieties which are highly susceptible to powdary mildew.

x) Niger is also having very low yielding levels, mainly due to poor management/production practices adopted by the farmers. High yielding varieties with high oil content are needed.

xi) Gram suffers due to furarium wilt as most of the area is wilt-sick and the varieties grown by the farmers are susceptible to this wilt.

xii) Kalitur (Black-Soybean) is also grown for its ability to grow even under adverce situations, but it is highly shaltering type.

xiii) Kodo-kutki are very low yielding and loss remunerative.

(xiv) There is no source of supply of certified seed of Potato which is the biggest constraint of increasing productivity of this crop.

xv) The farmers are ignorant of high yielding disease resistant varieties and appropriate management practices of potato cultivation.

xvi) Although grean chillies, for export purposes, are grown almost all the year round but the information on varietal suitability, crop management practices, pest and diseases are lacking.

xvii) Ginger cultivation has to come to almost extent due prevelance of soft rot disease.

xviii) Onion and garlic though are important vegetables of bulbus group. The information is lacking on rabi varietal identification management and pest control.

xix) Though the farmers are aware of the improved varieties, but due to lack of availability of seed, these are confined to a limited area.

xx) Fersarium wilt in gram and mosaic virus in moong and urad are the problems of this sub-region.

xxi) Availability of certified seed of improved varieties of potato is meagre which is the biggest constraint in increasing productivity of this vegetable crop.

7.7.3 Specific Constraints Identified in Sub-Region-III

I) Soils of this situation are having very poor drainage hence creates problem in inter-culture operations.

ii) Sizeable area in this situation is still under deshi jowar which is very low yielding and late in maturity and therefore forbids planting of rabi crops.

iii) Wheat gram and Arhar yields are very low as farmers are still growing their local seed bulk which is low yielding as well as susceptible to diseases and pests.

iv) Nagpur variety of oranges are grown in this situation. The orchards are deteriorating each year because of the sooty mould disease. There are also number of other diseases viz. dieback, Iummosis, and other which have also been identified which are responsible for degeneration of orchards.

v) Hybrid cotton variety JKH-1 has been observed to be susceptible to wilt due to failure of late monsoon.

vi) Almost no inputs are given to the crop grown under rainfed conditions.

7.8 Strategy for the future Development of Sub-Regions of selected district :

Taking a sub-region as a unit following are few specific suggestions for all the three sub-regions of the district which need attention :

7.8.1 Crop Improvement :

i) Development of high yielding varieties of niger, sorghum, maize, soybean, tur and gram which may fit well in double cropping system in these sub-regions.

ii) The local deshi jowar which is extensively grown by cultivators suffers due to long dry spell of monsoon and results in poor yields. There is an urgent necessity to develop dual purpose short duration and drought resistant sorghum varieties.

iii) Development of varieties resistant to wilt in gram, mosaic virus in moong and urid.

7.8.2 Soil, Agronomy and Agricultural Engineering :

i) In black cotton soil, establishment of crop stand in rabi season is a serious problem because of lack of moisture in top soil and poor seed bed preparation. Efforts are needed to test suitable implements and seeding devices to secure good crop stand.

ii) The district is predominantly mono-cropped area. There is a need to work out suitable crop sequences to increase the croping intensity.

iii) In shallow soils low moisture retention as well as poor nutrient availability is a serious factor responsible for low yields. Therefore efforts are required to work out appropriate manurial schedule including use of organic and in organic manures and wherever possible inclusion of green manuring crop for improving water retention capacity and productivity of soils.

iv) Whatever limited irrigation facilities are available, water is a scarce commodity. Efforts are therefore needed to work out proper schedule and methods of irrigation for more remunerative crops. Wat r production functions of different crops with protective irrigation need to be worked out.

7.8.3 Vegetable Crops :

Potato is becoming a major vegetable crop in this area. Besides, other vegetables like cauliflower, Cabbage, Cucurbits etc. are also grown. Some of the important problems need to be tackled are as follows :-

i) To identify suitable high yielding varieties of potato for kharif as well as main season.

ii) To economise the cost of seed of Potato which accounts for 50% of total cost of cultivation, Cheaper sources of crop raising such as use of true potato seed (TPS), stem cuttings etc. need to be assesed.

iii) To develop most profitable crop rotation for potato.

iv) To study nutritional requirement of Potato, weed control measures and cultural practices.

v) Studies on various chemicals to check sprouting in harvested potato.

vi) Varietal evaluation of vegetables (other than Potato) and their cultural practices).

vii) To study various measures for minimising post-harvest losses in storage and transport.

7.8.4 Plant Protection :

i) Wilt in gram and arhar and mosiac virus in moong and urid are serious problems. Besides developing resistant varieties, control measures for these diseases need to be developed.

ii) Identification of important diseases and pests, periodicity of occurrence, survey and surveilence for forcasting important diseases and pests of crops grown in this district need to be studied.

7.8.5 Research- Extension linkage :

i) There is urgent need to improve the quality of on-farm trials and testing production technology under different micro-farming situations in collaboration with the Department of Agriculture and other field functionaries.

ii) Identification of socio-economic constraints in agricultural production.

7.9 The sub region II located in the high hills of Satpura Plateau of the district which receives about 1200 to 1400 m.m. annual rainfall. Soils are skeletal gravelly with steep slopes and are surrounded by dense reserve forests. This is predominantly a mono-crop (kharif) area with kodo-kutki and Niger as important crops grown on very shallow and highly slopy lands with 1-2 q/ha yield. The irrigated area is very low (about 10%). Despite high rainfall, crops suffer due to drought because of highly slopy land with shallow soils having low water retention capacity.

Practically no fodder crop is cultivated. Animals largely depend on grazing resulting in their low productivity. Crop like soybean, sorghum, til, urid, gram can also be grown successfully and productivity of kodo-kutki and niger can be improved substantially.

There is a possibility of introducing tuber and root crops. Animal enterprises need attention in terms of better nutrition for which locally available fodder resources need to be improved. Possibilities of growing grasses, fodder, grain and other high value vegetable crops alongwith forest trees need to be explored. Introduction of high value forest trees viz., Chironjee, mahua, aonla, ber, custard apple, tamarind, bhimla, and Kanjee may be assessed.

Keeping in view these peculiar circumstances and poor economic condition of the predominantly tribal population following development stretegies are suggested :

(i) To identify more suitable crops and varieties since kodo-kutki and niger are less remunerative crops.

(ii) Development of location specific crop production technology i.e. till[illegible] requirement, seeding device, date of sowing, seed rate, plant population, doses of fertilizers and methods of application and cultural practices for weed control in kodo-kutki, niger, soybean, sorghum, til and gram.

(iii) Introduction of suitable tuber and root crops and working out management practices for vegetable crops on shallow soils.

(iv) Introduction and testing of high value forest trees and exploring possibilities of inter-cropping of vegetables, fodder, grasses and short duration pulses and oilseeds crops with forest trees.

(v) Developing devices for moisture conservation and efficient methods of irrigation on highly slopy and shallow soils.

(vi) Assessing fodder value of localy available crop and forest residues and improving their quality.

(vii) Introduction and testing of fodder trees, grasses and fodder crop for stall feeding with a view to improve animal health and productivity.

(viii) To develop suitable farming system involving crops, animals, bee keeping and sericulture for higher income and employment.

(ix) To conduct larger number of field demonstrations on improved crop production technology and arranging training of the farmers.

(x) Studies on adoption pattern and constraint analysis for non-adoption of improved technology.

7.10 Horticultural Aspect

In sub-region-III two blocks viz. Sausar and Pandhurna which contiguous of Santra belt of Maharashtra are important mandarin orange producing centres. No efforts have been made in the past to improve this citrus growing sub-region in this district.

The existing orchards are facing many problems eventually yields of citrus trees have decreased in recent years. Citrus decline in this sub-region is mainly due to the factors like mal-nutrition, defective cultural practices and improper management of pest and diseases. They sooty mould diseases locally known as 'Kolshi disease' caused by white flies has threatened the very existance of orchards.

Citrus production should be taken up on scientific lines in this sub-region and following production stretegies be developed keeping in view the requirements of the country as a whole :-

(i) Collection and evaluation of varieties of loose skinned oranges and some arid zone fruits such as custard apple, Pomegranate, ber etc.

(ii) Breeding of suitable varieties of mandrins and root stocks.

(iii) Studies on the effect of different root stocks on growth, yield and quality of Nagpur oranges and Mosambi.

(iv) Studies on the effect of different cultural operations such as nutrition, weed control, methods of irrigation, regulation of flowering on productivity and economic life of trees of Nagpur orange.

(v) Studies on causes and control of fruit drop in mandrin by using plant growth substances.

(vi) Identification of suitable inter crops for citrus orchards.

(vii) Survey of different insect pests and nematodes in the oranges and their control.

(viii) Population dynamies and bioecological studies of citrus Psylla, fruit sucking moth and white fly and their control measures.

(ix) Studies on causes and control of 'Kolshi disease'.

(x) Survey of natural parasites and predators and exploring the possibility of biological control of pests of citrus.

(xi) Survellance of aphids of citrus acting as vector for tristeza virus and their control.

(xii) To develop effective measures for control of gummosis, bark scaling, citrus canker and viral diseases.

7.11 Findings :

1) Decentralised planning scheme was initiated by the State Government of Madhya Pradesh with the purpose of preparing plans at the sub-regional level.

2) The official directive is to prepare plans on the basis of needs, potential and level of the sub-regions.

3) In the state of Madhya Pradesh the decentralize planning at the district level was intiated in the Seventh Five Year Plan and District Planning Board (DPB) were established in all the 45 districts to formulate and implement the district level schemes prepared by the DPB. The process of decentralization in State Planning

Board has been adequately extended by the distribution of funds gram-panchayat-wise and also allowing their participation in decision making and execution of schemes with the funds provided.

The District Planning Board, Chhindwara is consisted of a large number of members. They are as follows :

(i)	Minister in-charge of the District	.....	Chairman
(ii)	All M.L.As and M.Ps of the district	.. ..	Members
(iii)	District Panchayat President	.....	"
(iv)	All Janpad Panchayat President	.....	"
(v)	President of Cooperative Banks	.....	"
(vi)	Seven Social Workers nominated by State Government	.....	"
(vii)	District Level Officers of the various departments	.....	"
(viii)	Collector	.....	Member Secretary
(ix)	District Planning Officer	.....	Member Dy. Secretary

The DPB is a constituent of the office of the district Collector and works as District Secretariat for planning purpose. The Collector is the sole authority coordinating the all sided development activities including agriculture, of the district. The DPB is also assisted by the executive committee which has the following setup.

(i)	Collector	.....	Chairman
(ii)	All Heads of the Department (District level)	....	Members
(iii)	All Officers in-charge (Representative of lead bank, Manager District Rural Bank, Cooperative Bank, IDB and MPEB)	.....	Members
(iv)	District Planning Officer	.....	Member Secretary

With the establishment of DPB, the heads of the various departments of district level are responsible to prepare the appropriate schemes for seeking financial assistence from the DPB. The proposed schemes are reviewed by the members of the DPB before allocation of the fund. Once the scheme is approved, the head of the department at district level will be responsible to excute the project. There is enough flexibility provided in the planning process, Reprioritization of the schemes is based on the feedback analysis in terms of its tangible and in-tangible benefits to the beneficiaries.

4. The profile prepared for the Chhindwara district is only suggestive of the need for planning exercises at the sub-regional level. The basic constraints in preparing the profile so as to determine the existing human, natural resources and the level of development is the lack of up to-date data on the various aspects of the economy. The profile prepared for the district suggest that the district is agriculturally not advanced.

5. In Chhindwara district tribals constitute a sizable proportion of the total population. Gonds are the most of the scheduled tribes of the district. Tribals living in rural areas of the district are primarily dependent on agriculture and forest produce. Evidently, agriculture is the main source of livelihood of most tribals. However, agriculture in tribal areas of the district is most under developed and backward. Consequently, productivity is very low. Development of agriculture is, therefore, important for improving the socio-economic conditions of tribal population in Chhindwara district.

In the tribal villages of the district, the area under irrigation is negligible. Therefore, more emphasis should be put

on dry farming practices. However, due to outdated farm practices and lack of suitable seed varieties, the yield is very low. Improvement in dry farming practices in unirrigated villages as well as development of suitable varieties would help to boost production and productivity.

7.12 Conclusion :

In Madhya Pradesh an attempt at decentralisation of the planning process has been started. Planning in the true sense of the terms has yet to take its roots.

7.13 Suggestions :

1. It is highly necessary to prepare a base line status report of the districts by mapping up all resources for development, assess the needs and potential for developing various sectors of the economy and annual updating of these report so that level of development is indicated. If these status reports of all districts are prepared the state level planning would be benefited. If this task is undertaken now it would be helpful in preparation of the 9th plan on the basis of district plans.

2. The basic data for the exercise mentioned in para 1 above can easily be spelled out. The Planning Commission had spelled out the data requirements for Block level planning. This may be supplemented with data requirements for the district level.

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