Ad-hoc Study No.40

A STUDY ON THE ECONOMICS OF DRYLAND FARMING IN REWA DISTRICT, MADHYA PRADESH

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CHAPTER I

INTRODUCTION

Agriculture in large parts of India is still a gamble in rainfall and nearly 42 per cent of our agricultural production is dependent on vagaries of monsoon. " It is this element of uncertain rainfall that often leads to either partial or complete failure of crops resulting in famine or near famine conditions in large areas in the states of Tamilnadu, Karnataka, Andhra Pradesh, Gujarat, Rajasthan, Punjab, Haryana, Uttar Pradesh, and Madhya Pradesh. These states constitute major portion of the dry farming areas. The areas are characterised by low annual rainfall of 400 to 1000 mm. and have irrigation facilities for less than 25 per cent of the net area sown. Agriculture in these areas suffers from low productivity and high instability. Such areas constitute nearly 36 per cent of the net sown area of the country covering nearly 47 millon hectares. " 1

The increasing need of agricultural development of these areas has drawn the attention of our scientists in finding new ways of increasing the output per hectare. There has been little change in cropping patterns or cultural practices. This is largely because of the non-availability of the drought-resistant and fertilizer responsive varieties of crops and the natural aversion to risk involved in application of high cost inputs such as fertilizers under unirrigated conditions. Unless the dryland agriculture is developed on modern scientific lines with suitable

farming technology and crop combinations, the cultivator in a dry farming region will lag behind the more privileged cultivators having irrigation facilities. The problems of dryland farming are not only confined to India but many developed and under developed countries have to face it. In this connection the example of a country like Israel, which has overcome many adverse factors to develop dry area farming and shown to the world that with scientific and systematic study, desert land could be transformed into productive agricultural land.

1.1 Intensive Dryland Agricultural Development Programmes

" In view of the gravity of the problem an important objective of the fourth plan was to make a significant impact on dry farming. The programme envisaged had two objectives (1) Research into improved dry farming technology and (2) Application of such technology to dry farming areas. For undertaking the application of above technology to dry farming, the Fourth Plan proposed some pilot projects in the Central sector with a financial outlay of Rs. 20 crores during the Fourth Plan period. These projects were

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1. Venkat Raman, L.S. and Jha, D.N. , Dimentions of Dry Farming Problem ", New Technology for Dry Land Farming, ICAR, 1970, PP. 5-8.

known as the ' Integrated Dryland Agricultural Development (IDAD) Projects. Each project would be linked up with one of the main or sub-centres for research in dry farming. It was proposed that in the first year about 1,000 hectares of compact area might be covered by each project. In the second year, depending upon the success in the initial year, the area coverage might be increased by 4,000 hectares and in the last 2 years to about 10,000 hectares ". 1

1.2 Dryland Agriculture in Madhya Pradesh

In Madhya Pradesh only 8.9 per cent area is under irrigation as against the 24.2 per cent for the country as a whole. Moreover, the undulating nature of land scape studded with hill ranges of Vindhyas and Satpuras and large tracts of relatively poor shallow soils result in aggravating the low agricultural productivity. A highly skewed distribution of land holding and preponderance of small holdings and landless labourers further complicate the problem.

The dry farming areas include 26 districts Viz. Sidhi, Shahdol, Surguja, Balaghat, Raipur, Raigarh, Bastar, Panna, Rewa, Seoni, Vidisha, Raisen, Hoshangabad

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1. Sarveswar Rao, B. , Report on a study of Integrated Dryland Agricultural Development Project, Hydrabad District, Andhra Pradesh, 1976, PP. 4 and 5.

Narshingnpur, Ratlam, Rajgarh, Ujjain, Shajapur, Dhar, Indore, West Nimar, Jhabua, Chhatarpur, Betul, Chhindwara and Guna.

Among these Rewa and Panna districts show extreme susceptibility to drought and severe drought which occur for 2 to 3 years in a period of 12 years.

1.3 I D A D in M.P.

During the Fourth Five Year Plan a centrally sponsored scheme for Integrated Dry Land Agricultural Development was initiated in M.P. ICAR has established main research centre at Indore and a sub-research centre at Rewa for evolving new technology for dry farming areas.

1.4 I D A D in Rewa District

The area of the project lies between 81°10/E to 81°17/E longitude and 24°30/N to 24°35/N latitude towards north-east of Rewa city. The total area of the project is 10,310 hectares, comprising 41 villages. There are 3 all weather roads Viz; Rewa-Satna, Rewa-Gadhwa and Bela-Gadhwa in the project area. The project area is 5 km. away from the Dry Land Research Sub-Centre and 2 km. from the district headquarters. Allahabad Bank is the Lead Bank for the area and is financing for short, medium and long term loans for the whole of the project area. In addition the State Bank of India is also financing through Societies.

The entire project area has 3,021 families among which 1,739 families are mostly dependent on agriculture. Other families are either labourers in business and in service. The total population is 11,315. Considering the existing production pattern of crops the consumption estimate is ½ kg of grains per capita per day. There is no consumer surplus left in balance for the entire tract. This is an indication of poverty and dwindling income which hits the population at large during drought or unfavourable weather.

1.4.1 Objective of the Scheme

The main objective of the scheme is to introduce such practices which give favourable and economical results, in drought conditions so that the financial conditions of the cultivators would improve. To accomplish this objective new crops like sunflower saflower, rape and groundnut have been introduced. Short duration varieties of arhar, moong, paddy have also been introduced to escape the moisture deficiency The full package of practices recommended by the agronomist of the research centre are being followed for such crops. Demonstrations are also layed out of different improved dry farming practices. Training camps and film shows are also organized nearby the demonstration fields to train the farmers regarding new technology of dry farming. Water harvesting and soil conservation works are other activities.

Deep placement of fertilizers, rectangular and square methods of planting of paddy, line sowing of Kharif-crops and use of foliar spray with urea are being popularised. Further, the improvement of irrigation potential by construction of new wells, repair of old wells, construction of tube wells and boring of wells are also advocated. Oil engine pumps and electric pumps are installed. New farm implements and machinery like Shabash plough, bakhar, Singh patela, seed drill, leveller, scraper, winowing fan, hand sprayer and power sprayer have been introduced.

To improve the financial condition of the cultivators milch animals are being provided. Fodder crops including napier, berseem and M.P. Chari are grown by the cultivators who have developed irrigation facilities.

The development of Dry Land Area in Rewa district includes following programmes.

1. Land improvement
2. Minor irrigation
3. Livestock improvement
4. Fertilizer use
5. Agricultural machinery
6. Plant protection/preventive measures
7. Improved seed

1.4.2 Project Set up of the Scheme

Though the scheme was sanctioned by the Government of India on 11.2.71 the functioning started on 1.7.71.

The project is headed by a Project Officer. He is helped by a team of technical persons including one assistant soil conservation officer, one Veterinary Assistant Surgeon, two Agricultural Assistants (U.D.) and two Agricultural Assistants (L.D.).

At the village level Gram Sevaks and Surveyors help in the implementation of the programmes.

1.5 Objectives of the Present Study

The objectives of the study are following.

1. To assess the extent of adoption of dry farming recommended practices.
2. To study the existing farm resources and the level of farm income of the non-adopters as compared to the farmers adopting the dry land agricultural practices.
3. To examine the possibilities of adoption of dry land agricultural practices and the benefit accruing from them.

CHAPTER II

REVIEW OF LITERATURE

Parmatma Singh and D.D. Gupta examined the economics of dry farming in Haryana (District Mohindragarh) by using the relevant data of 33 farms for 1970-71. They attempted to study the input/out-put relationship of crops and crop rotations and the extent of adoption of dry farming technology. Size groups did not show any significance. Hence fallow-mustard rotation was found to give the maximum net profit of Rs. 563.73 per acre. The net profit from other rotations such as bajra-gram was Rs. 175.50, Rs. 185.79 from Jowar-gram, Rs. 471.34 from guara-barley, Rs. 305.64 from guara-gram as Rs. 114.24 from fallow-gram. Farms were found to be fully acquainted with the dry farming technology and the non adoption was mainly due to lack of irrigation facilities.

A.S. Kahlon, S.S. Miglani and Harwant Singh studied the cropping pattern and related profitability under irrigated and unirrigated conditions in the Ferozepur district, Punjab, Guara deshi, bajra and gram were found to give higher returns on unirrigated than on irrigated farms. Gram mixed with wheat and also with barley was found to be more profitable on irrigated farms.

Mr. M.V. George and, A.C. Gangwar and Vijay Kumar have studied net returns from the existing as well as from the suggested plan with improved technology from small medium and large farms. The suggested plan showed an increase in income by 221,148 and 194 per cent

respectively, on small, medium and large farms. Similarly human and bullock labour utilization also increased with the adoption of improved technology. The study showed that with proper management of crops and rotations, the employment and net returns from dry farming could be increased several fold.

Desai, N.K., studied the economics of mixed farming in the charotar region of the Kaira district. The data for this study were collected from one Palidar family and referred to the period May 15,1955 to June 15, 1956. The study shows that the farm family under study blended crops and livestock production to mutual benefit. The crop production supplied 76.65 per cent of fodder and 26.18 per cent of feeds needed by livestock. The livestock in its turn aided full utilization of feeds and fodder and created additional employment for family labour, particularly for the female labour. The livestock also supplied farm yard manure for crops. Because of these complementary and supplementary relationships between crops and livestock the farm family could produce crops and milk worth Rs. 4,426.94 with the cash expenditure of Rs. 1,596.53 only.

Dhondyal, S.P., compared mixed farming in two different regions of U.P., viz, Western and Eastern U.P. to know in which area mixed farming is practised in real sense.

The analysis shows that farms in Western U.P. present essential virtues of mixed farming, both in acreage under fodder and legumes and in the complementary role of livestock production to gross receipt of the

farm as unit. Whereas the farms in the Eastern U.P. can not be treated as a mixed farms. The author further feels that under Indian conditions a farm to be termed as mixed farm must have 20 per cent of its gross receipt from the milch cattle. So far as acreages are concerned, the minimum fodder area should be one acre cropped land for two animals. The number of animals on farm should be such that would most profitably utilize by-products without putting undue burden on cropping scheme.

Gupta S.B. Lal, measured the variability of yields, prices and income for the selected crops in the Varanasi district. He concluded that (i) Yield variability varies considerably from crop to crop. In general the variability of rabi crops is lower than that of the kharif crops. (ii) Price variability, in general, is considerably lower than yield variability (iii) Gross income variability, like yield variability for rabi crops, in general, is lower than that of kharif crops and this was only due to yield variability.

Sen, S.R. in his address delivered at the Twentieth Annual conference of the Indian Society of Agricultural Statistics, at Waltair pointed out the general problems of " Growth and Instability in Indian Agriculture. " The first problem was the lack of required data itself. He grouped the states according to the probability of the occurance of droughts once in 5,4,3 and 2.5 years. An analysis of 24 years data revealed that while food - grains production showed a rising trend, the instability was also on the increase or instability tended to increase with the rate of growth. He further suggests, that the whole country should be divided into three regions :-

(1) Area with assured water supply both in volume and spread either from assured rainfall or from source of irrigation.

(2) Areas where the supply of water depends upon monsoon.

(a) Where the droughts are less frequent.

(b) Where the droughts are frequent.

For such areas drought resistant varieties should be evolved and optimal doses of water and fertilizers should be worked out. Protective irrigation to provide security is essential for crops.

(c) Areas which do not have dependable irrigation and where rainfall is scanty and precarious. Efforts should be concentrated on contour bunding and contour cropping, dry farming practices and controlled grazing. Sprinkler irrigation should be encouraged.

Das Gupta H.K., estimated the costs and returns from converting dry areas into irrigated areas in Orissa where about 42 per cent of the cultivated area is exposed to scanty and erratic natural precipitition. The total annual cost varied from Rs. 1,862/-to Rs. 4,877/- per hectare depending upto the nature of installation, horse power of the engines, the working hours and the area irrigated. The cost of irrigation was observed to be varying from Rs. 384/ to Rs. 473/- per hectre which could be substantially (30-50%) reduced by full utilization of irrigation potential. With respect to the benefits desired from the project, it was noticed that the intensity of cropping rose from 140 to 278 per cent with greater utilization of labour and capital.

The returns over variable costs was nearly six times on land provided with irrigation facilities over non-irrigated farms.

Jodha N.S. and Purohit S.D., set-forth the problem of crop yield instability and surveyed the effects of weather variability on some major crops in arid regions of Rajasthan were analysed. The analysis of weekly rainfall data for 47 years (ending 1955) indicated the probability of early droughts of 13 per cent, mid season droughts of 22 per cent and late droughts of/[11] per cent. In other words the probable occurance of crop famines due to the " drought weeks " as specified above are four times in a period of ten years due to early droughts, two times in a period of ten years due to mid season droughts and once in 10 years due to late droughts.

The extent of yield instability is indicated by co-efficient of variation of crop yields calculated from the yield data for 15 years. Thus deviation of actual yields from normal yields of different crops would give better picture of crop instability. Such deviations were 30 per cent in case of bajra, 48 per cent in case of kharif pulses and 58 per cent in case of Jowar.

Shingarey, M.K. treated dry area as one which depends on rainfall and used only yield and price data from Maharashtra for a period of 5 years. He hypothesised the instability in weather conditions from year to year gives rise to instability in crop output, which in turn, affects the prices and finally the income of the farmers. He rightly pointed out that high correlation between prices of different crops makes price stability difficult.

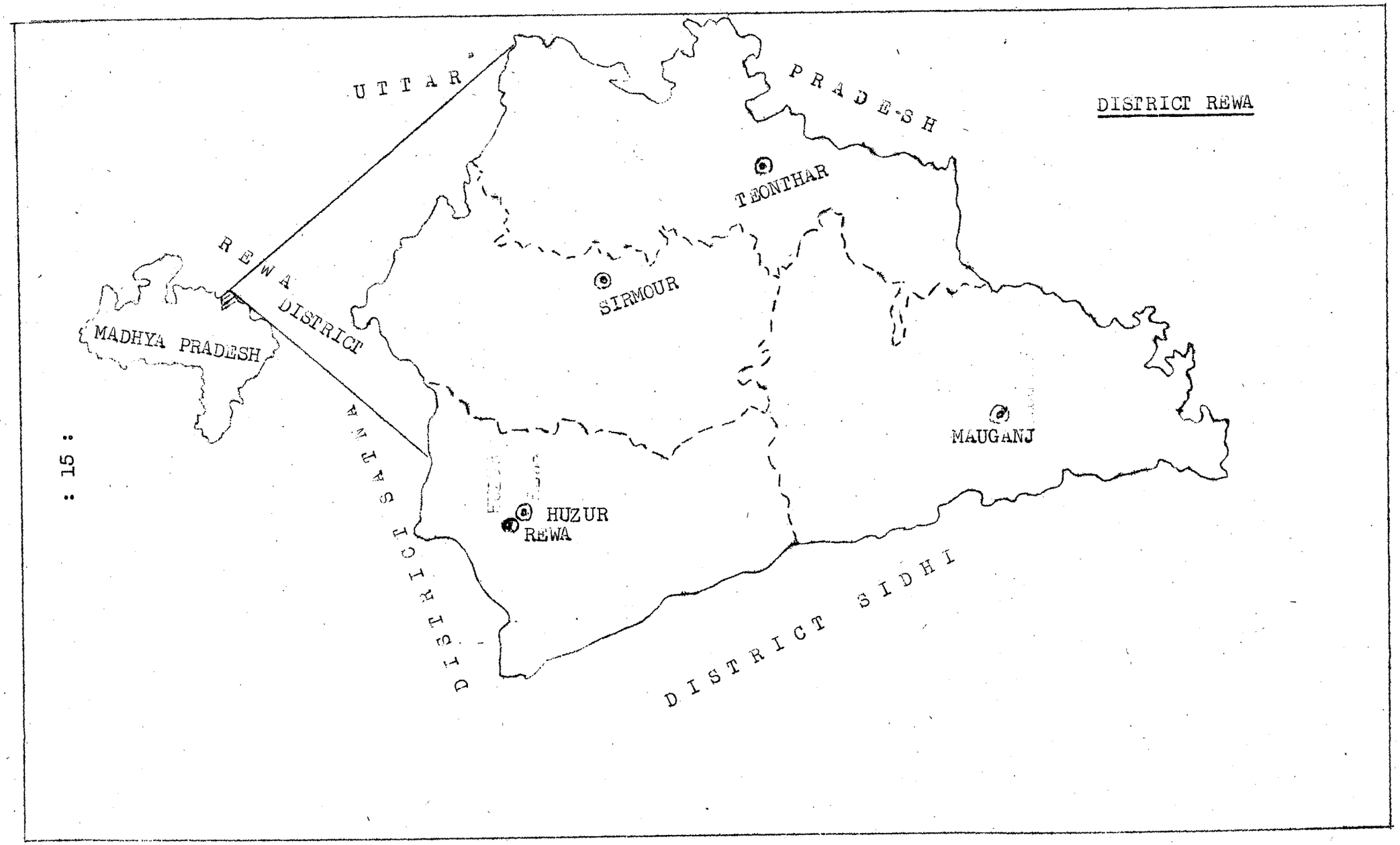
M.V. Nadkarni studied the yield uncertainty in Maharashtra Agriculture for 18 years ending 1968-69. He worked out the coefficient of variations for different crops in Maharashtra to measure their yield fluctuation. The various alternative measures used to measure yield uncertainty were (1) simple arithmetic average (2) bulk average (3) trend estimates and (4) five year moving average. He found that at the district level irrigation is not found to affect the cotton yield though at the state level it does, and accordingly he concludes that irrigation is not expected to be a major factor in inter-district variation in yield rates. He asserted that irrigation reduced the year to year variation in yield of cotton.

Agrawal R.C. and Shah S.L. used 20 years (1950-70) official statistics to determine the extent of crop yield variability of a few important crops in the dry farming districts of Uttar Pradesh having an average rainfall of 1,000 mm. or less.

The districts selected were Jhansi, Jalaun, Mathura, Hamirpur and Banda. The crops studied were rice, wheat, barley, jowar, bajra, maize and gram. The variance and coefficients of variation for each crop and rainfall were calculated to measure variability in them. It was concluded that existing cropping pattern was found to be optimal in view of the variability of crop yields. Gram appeared to be most stable crop under rainfed conditions and its high yielding varieties should be evolved. Crop insurance and livestock farming was also suggested to meet the income variability in these areas.

Shukla, V.P. worked out optimum crop plans for 90 rainfed farms in Jabalpur district, Madhya Pradesh under the traditional and advanced technological set up. Programming techniques were used to explore the income raising potential of rainfed farms. The resources used were land (Kharif land and Rabi land and operating expenses) and each expenditures. The ten activities were considered for developing optional programme. (Wheat, Paddy, Masoor, Gram, Pea, Jowar, Arhar, Urad, Moong, Minor Millets). The optimum income from the existing resources through programming was Rs. 5,063 and Rs. 1,100 on traditional and advanced farms respectively. All the rabi land was used up in both the categories of farms but a part of the kharif land was left unused. The programmed crop plan included only three crops (Wheat, Paddy and Pea) in traditional farms and four in advanced farms (Wheat, Paddy, Pea and Urad). It was found that the net gains due to technology alone were to the tune of 32 per cent and 28 per cent in income over the existing income in the traditional and advanced farms respectively.

Kahlon, S.S. and H.S. Sandhu indentified dry farming zones in Punjab and make an interesting study of the zonal characteristics, moisture conservation methods and patterns of input used and net profits from crops grown in these zones. Ground-nut and mash was found to give maximum profit in the northern and central zones, while sarson (Mustard) in southern zone. The cultivation of wheat in southern zone resulted in a loss Rs. 124/- per acre.


DISTRICT REWA
UTTAR
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REWA
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MADHYA PRADESH
SATNA
DISTRICT
MAUGANJ
HUZUR
REWA
DISTRICT SIDHI

CHAPTER III

ECONOMIC BACKGROUND OF SELECTED DISTRICT & VILLAGES

As mentioned earlier Rewa district was selected for the study. A brief discription of the selected district and that of the selected villages is given below.

3.1 Rewa District

Rewa district is one of the northern district of the state and is situated between latitude $24^{\circ}18'$ N and $25^{\circ}12$ N and longitude 81° 20 'E and $82^{\circ}18'$E. It comprises of four tehsils viz. Teonthar, Mauganj, Huzur and Sirmour. The district is bounded by the state of Uttar Pradesh in the north, Amarpatan and Raghurajnagar tehsils of Satna district in the West, Sidhi in the south and in the east again with Uttar Pradesh.

3.1.1 Physical Features

The Huzur, Sirmour and Mauganj tehsils lie between the Kymore ranges on the south and Vindhyachal on the north and form the Rewa Plateau. The Teonthar tehsil lies to the north of Vindhyachal which is in many respects quite different from the three plateau tehsils. Except in the extreme east, in the Mauganj tehsil where a number of hills relieve the monotony of the plain, and in a strip in the extreme south lying along the Kymore ridges the plateau is a wide alluvial plain of about 304.8 metres height. In the strip of country enclosed by Kymore ridges flows river Adh from west to east.

3.1.2 Rivers

The Kymore ridge forms the watershed for the district and most of the rivers in the district flow north to join the Tamasa. The Tamasa enters the north- western part of Sirmour tehsil. At Purwa, it falls 67 metres below to the level of the Teonthar plains. After the falls it flows through high banks for a few kilometres and then enters the Teonthar, where its bed is ravinous.

Bihar river rises on the Kymore hills. Near Rewa town it is joined by the river Bichia. At Chachai, about 8 kilometres to the south west of Sirmour the Bihar falls 112.8 metres and joins the Tamasa.

Mahanadi another affluent of Tamasa flows through a ravinous course in Teonthar tehsil and joins the Tamasa.

3.1.3 Rainfall

The district receives moderate rainfall starting generally towards the middle of June. The downpour gains in intensity till August and then declines and then declines and completely stops sometimes in the month of October. July and August are the months of the heaviest rainfall. The district average (ignoring the Govindgarh recording station) comes to 1,102.8 mm.. The rainfall during 1975-76 is given in the following table.

Table 3.1 Monthwise distribution of rainfall, Rewa district, 1975-76

(Unit- millimetres)

Month	Rainfall mm.	Rainy days
June	153.3	6
July	372.3	13
August	397.2	16
September	111.4	8
October& November	47.7	4
December to March	3.2	2
Total rains.	1108.1	51

3.1.4 Climate

As in other parts of the state, the district has the monsoon type of climate. The year has been divided into three seasons of more or less equal duration. January is the coldest month of the year. After January the temperature starts rising. The hot weather begins from the month of March. There after rise in temperature continues uninterrupted till the mean maximum and mean minimum temperatures attain their average peak values in June and May. The mean maximum temperature starts falling after May and the mean minimum starts falling after June, the month in which monsoon makes its appearence.

3.1.5 The Population

According to 1971 census the population of the district was 9,77,894 residing in 2,789 villages

and one town. The rural population is 92.93 per cent of the district population where as the urban population is 7.07 per cent as against the state percentage of 16.29. The percentage of literacy in the district was 19.27 as against the state literacy percentage of 22.14. Scheduled caste population formed 12.34 per cent of the total population and the scheduled tribes, 12.51 per cent. The number of electrified villages in the district till 1976 was 313.

Table 3.2 Villages and population of Rewa district

Particulars	Number	Percentage
Total population	9,77,894	-
Rural population	9,08,712	92.93
Urban population	69,182	7.07
Scheduled Caste "	1,21,029	12.38
Scheduled tribe "	1,23,339	12.61
Literate person	1,88,400	19.27
Total No. of villages	2,789	-
Total No. of towns	1	-
No. of villages electrified	313	-
No. of energised pumps	2979	-

3.1.6 Workers

Of the total population, 3,51,198 or 36 per cent were workers. Among workers 42.78 per cent were cultivators and 40.46 per cent were agricultural labourers (Table 3.3)

Table 3.3 Distribution of workers, Rewa district

Particulars	Number	Percentage.
Cultivators	150,245	42.78
Agricultural labourers	142,082	40.46
Live stock, forestry, fishing etc.	7,001	1.99
Mining and quarrying	156	0.04
Household industry	150,76	4.29
Other than Household Industry	4,137	1.18
Construction	1,327	0.38
Trade and commerce	7,963	2.27
Transport storage and communication	1,881	0.54
Other services	21,330	6.07
Total workers	351,198	100.00

3.1.7 Agriculture

In the following paragraphs various aspects of agriculture such as soils, land utilisation, cropping pattern, irrigation etc. are described.

3.1.7.1 Soils

The soils of the district are of the same character except in the northern Teonthar tehsil. The two main classes according to the settlement report of 1929, are sigaon and domat. Sigaon is a pure clay soil in which rice is grown mainly while domat is a mixture of sigaon and mair or pure black soil.

Mair is not found extensively, except in villages towards Garh in the Huzur tehsil. In all tehsil except Teonthar sigaon soils predominate, but the soil is great deal lighter. In Teonthar tehsil the clay sigaon is conspicuous by its absence and goes by the name of sigaon. This is very sandy, inferior soil. Damat in Teonthar tehsil is a mixture of sand and clay. Then in Teonthar tehsil there are large areas of dark soil called mair or matiyar. Refuse soils in the district are known as bhatha or bharra, which are very red poor gravel soils.

3.1.7.2 Land Utilization

The total geographical area of the district is 628.8 thousand hectares. Of this 58.75 percent was net sown area.

The area under forest is very low as compared as against 32.60 per cent to state figure. It is only 10.48 per cent for the state of Madhya Pradesh. The land not available for cultivation constituted 14.76 per cent (Table 3.4),

Table 3.4 Land utilization in Rewa district, 1975-76

Particulars	Area (Thousand hectares)	Percentage
1. Net area sown	369.4	58.75
2. Forest	65.9	10.48
3. Land not available for cultivation	92.8	14.76
4. Cultivable waste land	14.5	2.31
5. Other uncultivated land excluding fallow land	43.1	6.85
6. Fallow land	43.1	6.85
Total geographical area	628.8	100.00

3.1.7.3 Operational Holdings

The operated area was distributed over 104 thousand operational holdings. One fourth of these comprised less than 0.5 hectare each. Another 38 per cent holdings were between 05 hectare to 3.0 hectares. Seven per cent of the holdings belonged to the size group of 3..1 to 4.0 hectares. Thus 70 per cent of the holdings occupied 4.0 hectares or less each. But these holdings accounted for only 19.4 per cent of the operated area explaining the imbalanced distribution of agricultural land (Table 3.5).

Table 3.5 Distribution of holdings and operational area according to size of holdings, Rewa district, 1970-71

Size group (Hectares)	Number (thousand)	Percentage	Area (thousand hectares)	Percentage
Less than 0.5	25.9	24.7	6.5	1.4
0.5 - 1.0	14.1	13.5	10.3	2.2
1.0 - 2.0	15.7	15.0	23.7	5.0
2.1 - 3.0	10.3	9.8	25.8	5.4
3.1 - 4.0	7.3	7.0	25.7	5.4
4.1 - 5.0	5.7	5.4	25.6	5.4
5.1 - 10.0	13.8	13.2	101.7	21.4
10.1 - 20.0	8.0	7.6	115.3	24.3
20.1 - 30.0	2.2	2.1	52.4	11.0
30.1 - 40.0	0.8	0.8	27.0	5.7
40.1 - 50.0	0.4	0.4	16.9	3.6
above 50.0	0.5	0.5	43.4	9.2
Total	104.7	100.0	474.3	100.0

Source Agricultural Census 1970-71

3.1.7.4 Irrigation

Of the net sown area of 369 thousand hectares 21.6 thousand hectares were irrigated. Thus the irrigated area formed 5.84 per cent of the net sown area. Most important sources of irrigation were canals and commanded 35.65 per cent of the irrigated area. Wells were next important and irrigated 15.28 per cent of the area. Area commanded by other sources was 41.66 per cent of the area. (Table 3.6)

Table 3.6 Sources of irrigation, Rewa district, 1975-76

Source	Area (thousand hectares)	Percentage to total
Canals	7.7	35.65
Tanks	1.6	7.41
Wells	3.3	15.28
Others	9.0	41.66
Total	21.6	100.00

3.1.7.5 Cropping Pattern

Of the gross cropped area 71.00 per cent was occupied by cereals, 18.15 per cent by pulses and 9.64 per cent by oilseeds. Wheat was the important cereal and occupied 24.51 per cent of the gross cropped area. Paddy was the next important cereal and covered 24.05 per cent of the gross cropped area. Kodo was another important crop and constituted 14.06 per cent. Jowar and barley were other important crops. Among pulses gram and tur were important and formed 9.82 and 3.03 per cent respectively. Among Oilseeds

Table 3.7 Cropping pattern of Rewa district, 1975-76

Crop	Area (Thousand hectares)	Percentage
Paddy	110.5	24.05
Wheat	112.5	24.51
Jowar	19.1	4.16
Barley	15.3	3.33
Kodo-Kutki	64.6	14.06
Other Cereals	4.1	0.89
Total Cereals & Millets	326.1	71.00
Gram	45.1	9.82
Tur	13.9	3.03
Urd	2.7	0.59
Moong-Moth	2.4	0.52
Lentil	11.3	2.46
Teora	7.5	1.63
Other pulses	0.5	0.10
Total Pulses	83.4	18.15
Sesamum	2.5	0.54
Rape & Mustard	1.8	0.39
Linseed	39.5	8.60
Other oilseeds	0.5	0.11
Total Oilseeds	44.3	9.64
Sugarcane	0.1	0.02
Commercial Crops	1.9	0.41
Total fruits & vegetables	3.4	0.74
Total spices	0.1	0.02
Other minor Crops	0.1	0.02
Gross Cropped area	459.4	100.00

Linseed alone occupied 8.60 per cent of the gross cropped area.

3.1.7.6 Irrigated Crop

Wheat, barley, paddy, gram, tobacco, spices, sugarcane, fruit and vegetables were important irrigated crops.

The entire area under tobacco, condiments and spices was irrigated. Sugarcane was irrigated to the extent of 60.00 per cent. Fruits and vegetable 23.53 per cent. Wheat was irrigated to the extent of 16.62 per cent. (Table 3.8)

Table 3.8 Cropwise irrigated area, Rewa district, 1975-76

Crop	Irrigated area (thousand hectares)	Percentage to total	Percentage of irrigated area to area of the crop	Area under the crop
Paddy	0.88	4.08	0.80	110.50
Wheat	1.87	86.65	16.62	112.50
Barley	0.42	1.95	2.75	15.30
Other Cereals	-	-		
Gram	0.32	1.48	0.71	45.10
Other pulses	0.08	0.37	16.00	0.50
Rape & Mustard	0.05	0.23	2.78	1.80
Linseed	0.05	0.23	2.78	39.50
Other Oilseeds				0.50
Sugarcane	0.06	0.28	60.00	0.10
Total fruits and Veg.	0.80	3.71	23.53	3.40
Tobacco	0.12	0.56	100.00	0.12
Total spices & condiments	0.10	0.46	100.00	0.10
Gross irrigated area.	21.58	100.00	4.70	459.40

3.1.7.7 Production

By and large, the agricultural production of the district consisted of food grains (cereals and pulses). The total food grain production of the district was 217.8 thousand tonnes. This comprised of 171.8 thousand tonnes (78.88 per cent) of cereals and 46.0 thousand tonnes of pulses (Table 3.9)

3.1.7.8 Yield rates

A comparison of the per hectare yields, though limited to some principal crops, revealed that the performance of the district was poorer as compared to the state as a whole in 1975-76. Rewa obtained lower yield rates than the average for the entire state in respect of rice, wheat, jowar, tur, teora, peas lentil and sesamum. However, the yield of gram in the district was better by 10.94 per cent than the state average. (Table 3.10)

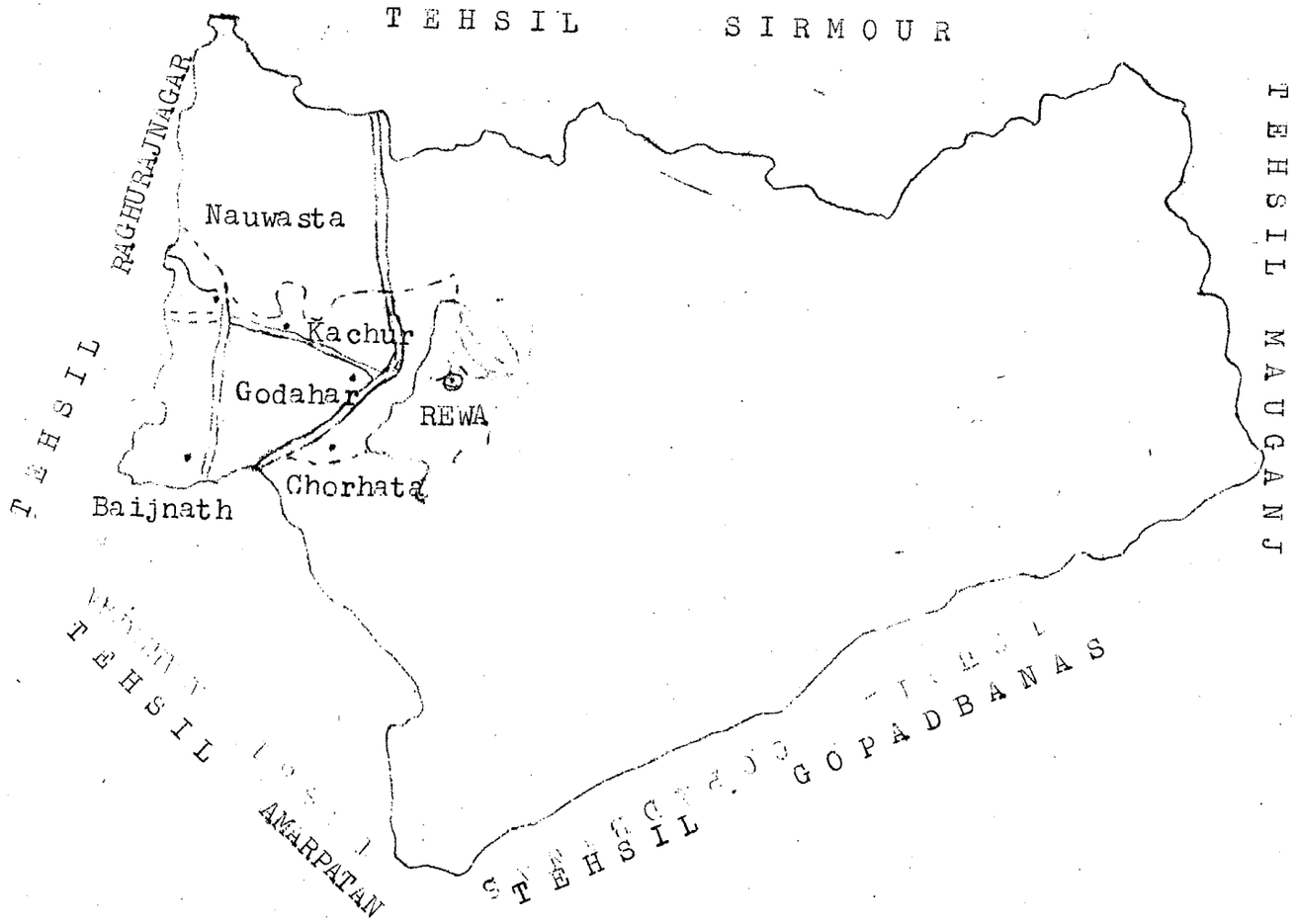
Table 3.10 Per hectare yields of principal crops in Rewa district and the state 1975-75

Crop	Yield per hectare		Absolute increase (+) or decrease (-) of the Rewa over M.P. state	Increase (+) or decrease (-) in Rewa as percentage to that in M.P.
	Rewa district	Madhya Pradesh state		
Rice	557	886	- 329	- 37.13
Wheat	663	854	- 191	- 22.37
Jowar	624	684	- 60	- 8.77
Gram	710	640	+ 70	+ 10.94
Tur	525	838	- 313	- 37.35
Teora	355	445	- 90	- 20.22
Peas	298	332	- 34	- 10.24
Masoor	258	441	- 183	- 41.50
Sesamum (Til)	87	156	- 69	- 44.24

Table 3.9 Production of Crops in Rewa district, 1975-76

Crop	Production (Thousand tonnes)	Percentage of total food grain production
Rice	58.3	26.77
Wheat	71.6	32.87
Jowar	11.9	5.46
Maize	0.9	0.41
Bajra	0.4	0.18
Barley	8.4	3.86
Kodon-Kutki	19.7	9.05
Sawa	0.5	0.23
Other Cereals	0.1	0.05
Total Cereals	171.8	78.88
Gram	32.0	14.69
Tur	7.3	3.35
Urd	0.5	0.23
Moong moth	0.5	0.23
Teora	2.7	1.24
Lentil	2.9	1.33
Peas	0.1	0.05
Total pulses	46.0	21.12
Total food grains	217.8	100.09
Sesamum	0.2	-
Linseed	6.9	-
Rape and mustard	0.5	-
Total oil seeds	7.6	-
Sunhemp (000 bales)	0.3	-
Mesta (000 bales)	2.6	-
Sugarcane	0.1	-
Potato	3.1	-
Tobacco	0.1	-

TEHSIL REWA


TEHSIL SIRMOUR
TEHSIL RAGHURAJNAGAR
TEHSIL MAUGANJ
Nauwasta
Kachur
Godahar
REWA
Chorhata
Baijnath
TEHSIL AMARPATAN
TEHSIL GOPADBANAS

3.2 Selected Villages

The following five villages were selected in Rewa district.

1. Baijnath
2. Chorhata
3. Godahar
4. Kachur
5. Nauwasta

3.2.1 Baijnath

The village is situated at a distance of 12 kilometers from the district head-quarters towards Satna on Bela- Gadhwa road. It has a primary school and post office within its boundary. The village is also the headquarters of the patwari and gram Panchayat. The cooperative society and gramsewak headquarters are situated at Maddhepur at a distance of 4 kilometres. For other facilities villagers go to Rewa.

3.2.2 Chorhata

The village is located at a distance of 8 kilometres from Rewa on Rewa-Satna road. The village has a primary school, middle school, post office and a dispensary. The village is also the headquarters of gram sewak, patwari and gram panchayat. The bus station and bus stop facility is also available in the village. All other facilities are available at Rewa.

3.2.3 Godahar

Village Godahar is located at a distance of 5 kilometres from Rewa on Rewa-Chhijwar road. It has a primary school, post office gram panchayat and veterinary dispensary. The headquarters of gram sewak and patwari are situated at a distance of 3 kilimetres

at Padra. Degree College, Commercial Bank, Land Development Bank and marketing society are all at Rewa.

3.2.4 Kachur

This village, is situated on Rewa-Chhijwar road 7 kilometres farther from the Godahar village. The village has a primary school, middle school, post office, cooperative society and gram panchayat. The headquarters of gram sewak and patwari are within the village. This village has the facility of fertilizer distribution centre.

3.2.5 Nauwasta

This village, like Kachur, is located on Rewa Chhijwar road 5 kilometres farther from the Kachur and 17 kilimetres from the district headquarters. However, the nearest post office, and gram panchayat, cooperative society and fertilizer distribution centre located at Kachur at a distance of 2 kilometres. The gram sewak and patwari headquarters are located at Maddhepur at a distance of 15 km.

CHAPTER IV

RESEARCH METHODOLOGY

4.1 Selection of the Project

Out of the two projects of Indore and Rewa, the latter was selected for this study.

4.2 Selection of the Villages

Villages falling in the project area were arranged in descending order as per their area under Integrated Dryland Programmes and the first 5 were selected. They were (1) Baijnath, (2) Chorhata (3) Godahar (4) Kachur (5) Nauwasta.

4.3 Selection of Cultivators

For the selection of cultivators lists of all cultivators of selected villages were obtained. The total cultivators were divided into two groups viz 'A' (Adopters) and 'N' (Non-adopters). The adopters were those cultivators adopting 3 or more than 3 programmes of Integrated Dry Land Programmes and the non-adopters were those resorting to the traditional practices. The adopters and non-adopters were arranged in ascending order according to the size of operational holdings* and were further divided into 5 groups viz

1. Less than 2.00 hectares
2. 2.00 to 4.00 hectares
3. 4.00 to 6.00 hectares
4. 6.00 to 8.00 hectares
5. 8.00 hectares and above

* For concepts and definitions used, please see Appendix-I

CHAPTER V

CHARACTERISTICS OF SAMPLE FARMERS

As mentioned in the previous chapter 30 adopter households and 20 non-adopter households formed the sample.

In this chapter, characteristics such as literacy, workers, size of operational holdings and ownership, irrigation, cropping pattern, assets, net profit, family labour income, farm business income and input-output ratio according to size of holdings are studied for the adopter and non-adopter households.

5.1 Adopter household

Adopter households were categorised into 5 groups according to size of operational holdings. Literacy, workers, land ownership, irrigation and cropping pattern, assets etc. were studied in relation to the size of holdings. Net return, family labour income and farm business income were studied in relation to size of holdings and according to combination of programmes.

5.1.1 Literacy

In the year 1976-77 the literacy percentage was 48.31. It was observed that the literacy percentage was generally higher on the larger size groups. It was highest (57.14 per cent) in the fifth group and the lowest in the first group (15.38 per cent).

The average year of schooling for the adopter households was 6.59. It was noted to be highest in the fifth group and lowest in the third group. However,

Table 5.1 Literacy of the ~~adopter~~ households

Size group (hectares)	Total No. of Persons	Total literates	Literacy percentage	Total years of schooling	Average years of schooling
Below 2.00	13	2	15.38	10	5.00
2.00 to 4.00	36	14	38.89	83	5.93
4.00 to 6.00	47	23	48.94	108	4.70
6.00 to 8.00	27	13	48.15	95	7.31
8.00 and above	84	48	57.14	363	7.56
Total	207	100	48.31	659	6.59

5.1.2 Workers

The percentage of workers to total population was highest in the largest size group and lowest in the smallest group. No relationship between workers and size of holdings was noted. (Table 5.2)

Table 5.2 Distribution of workers of selected households

Size group (Hectares)	Male		Female		Children		Total	
	No.	Percentage to total	No.	Percentage to total	No.	Percentage to total	No.	Percentage to total
Below 2.00	4	6.67	5	8.20	1	14.29	10	7.81
2.00 to 4.00	13	21.67	11	18.03	2	28.57	26	20.31
4.00 to 6.00	14	23.33	13	21.31	3	42.85	30	23.44
6.00 to 8.00	9	15.00	9	14.75	-	-	18	14.06
8.00 and above	20	33.33	23	37.71	1	14.29	44	34.38
Total	60	100.00	61	100.00	7	100.00	128	100.00

the average year of schooling in the first and second group was 5.00 and 5.93 respectively which was better than the third group (Table 5.1).

5.1.3 Ownership land

In the year 1976-77 the percentage of holdings purely owned was 56.67 and holdings partially owned was 43.33. In the first size group all the holdings were fully owned. After this group percentage of holdings partially owned increased in the larger size groups excluding the fifth group (Table 5.3).

Table 5.3 Ownership of operational holdings

	I		II		III		IV		V		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
Holdings purely owned	3	100.00	3	37.50	3	37.50	1	33.33	7	87.50	17	56.67
Holdings partially owned	-		5	62.50	5	62.50	2	66.67	1	12.50	13	43.33
Total	3	100.00	8	100.00	8	100.00	3	100.00	8	100.00	30	100.00

The percentage of area fully owned was 59.29 and the remaining few holdings had leased in some land. The operational area of these holdings (with leased in land) was 40.71 per cent of the total area. Among the size groups the first group had the fully owned area other groups had leased in land also (Table 5.4).

5.1.4 Irrigation

In 1976-77 the percentage of irrigated area to total operated area was 28.06. The highest percentage of irrigated area of 37.15 was observed on the largest size group i.e.8.00 hectares and above. There was no irrigated area on farms below 2.00 hectares. The larger percentage was observed on the largest size group and lowest on the second group. (Table 5.5)

Table 5.5 Percentage of irrigated area on adopter farms

Size-groups (Hect)	Total operated Area	Irrigated Area	Percentage of irrigated area to operated area.
Below 2.00	5.16	-	-
2.00 -4.00	23.04	0.41	1.78
4.00 -6.00	37.14	9.52	25.63
6.00 -8.00	19.38	4.04	20.85
8.00 & above	107.81	40.05	37.15
Total.	192.53	54.02	28.06

Among irrigated crops fodder, vegetable and pea were totally irrigated. Wheat was irrigated to the extent of 66.64 per cent and laha 50.00 per cent. Paddy was irrigated to the extent of 26.02 per cent, (Table 5.6)

5.15 Irrigation Sources

The highest percentage of irrigated area of 61.81 was commanded by tube wells and 19.23 per cent by well. The remaining area was irrigated by tank, bandha and nalla and formed 3.63 per cent, 0.74 per cent and 14.54 per cent respectively.

Table 5.8 Contd.

Crops	I Below 2.00 Area	%	II 2.00-4.00 Area	%	III 4.00-6.00 Area	%	IV 6.00-8.00 Area	%	V 8.00 & above Area	%	All Total Area	%
Gram	-	-	1.51	5.99	0.71	1.63	0.79	3.87	5.35	4.43	8.36	3.88
Arhar	0.12	2.16	0.88	3.49	1.32	3.04	0.55	2.69	4.29	3.55	7.16	3.32
Massor	-	-	0.89	3.53	0.61	1.40	-	-	2.63	2.18	4.13	1.92
Moong	0.02	0.36	0.40	1.59	0.64	1.47	0.67	3.28	0.93	0.77	2.66	1.23
Urad	0.12	2.16	0.06	0.24	0.81	1.86	-	-	1.01	0.84	2.00	0.93
Teora	-	-	-	-	0.41	0.95	-	-	0.74	0.61	1.15	0.54
Pea	-	-	-	-	-	-	0.39	1.91	0.45	0.37	0.84	0.39
Total Pulses	0.26	4.68	3.74	14.84	4.50	10.36	2.40	11.75	15.40	12.75	26.30	12.21

Table 5.8 Contd.

Crops	I Below 2.00 Area	%	II 2.00-4.00 Area	%	III 4.00-6.00 Area	%	IV 6.00-8.00 Area	%	V 8.00 & above Area	%	All Total Area	%
Linseed	-	-	0.81	3.22	1.80	4.14	1.17	5.73	12.55	10.39	16.33	7.58
Groundnut	-	-	-	-	0.20	0.46	0.81	3.97	0.71	0.59	1.72	0.80
Sun flower	-	-	-	-	0.20	0.46	-	-	-	-	0.20	0.09
Laha	-	-	-	-	0.02	0.05	-	-	0.02	0.02	0.04	0.02
Total Oilseed	-	-	0.81	3.22	2.22	5.11	1.98	9.70	13.28	11.00	18.29	8.49
Vegetable	-	-	-	-	1.38	3.18	-	-	2.93	2.43	4.31	2.00
Fiber	0.03	0.54	0.25	0.99	0.28	0.64	0.18	0.88	0. 86	0.71	1.60	0.74
Fodder	-	-	-	-	-	-	-	-	1.48	1.22	1.48	0.69
Gross Cropped Area	5.56	100.00	25.20	100.00	43.44	100.00	20.42	100.00	120.78	100.00	215.40	100.00

Although, the area under H.Y.V. of oilseeds the entire crop was under high yielding varieties (Table 5.9)

Table 5.9 Percentage of H.Y.V. area to total area under the Crop

Crop	Area under the crop	Area under H.Y.V.	Percentage of H.Y.V. to area under the crop
Wheat	87.90	73.70	83.13
Paddy	27.21	10.55	38.77
Jowar	16.82	0.81	4.82
Total cereals	131.93	84.43	64.00
Arhar	7.16	0.51	7.12
Pea	0.84	0.45	53.57
Urad	2.00	0.40	20.00
Moong	2.66	0.20	7.50
Total Pulses	12.66	1.56	12.32
Groundnut	1.72	1.72	100.00
Sunflower	0.20	0.20	100.00
Laha	0.04	0.04	100.00
Total Oilseeds	1.96	1.96	100.00
Vegetables	4.31	4.15	96.29
Fodder	1.48	1.48	100.00
Grand Total	152.34	93.58	61.43

The proportion of H.Y.V. area to area under the crops when studied for different groups indicated that the proportion was smaller on first two groups as compared to large groups. It was highest in the third size group. (Table 5.10)

Table 5.10 Percentage of H.Y.V. area to total area under the Crop according to size of holdings

Size groups (hectares)	Area under the crop	Area under H.Y.V.	Percentage of H.Y.V. area to area under the crop
Below 2.00	5.16	1.93	37.40
2.00 to.4.00	17.87	7.98	44.66
4.00 to 6.00	32.54	21.35	65.79
6.00 to 8.00	16.32	9.71	59.50
8.00 and above	80.45	52.61	65.39
Total	152.34	93.58	61.43

5.1.8 Structure of Assets

The total value of assets in 1976-77 was Rs. 13,80,036.00 Of this the land alone constituted Rs. 11,63,000.00 and formed 84.28 per cent of the total assets. Livestock, implements and machinery accounted for 7.38 and 4.79 per cent respectively.

Among the groups the percentage value of land generally increased with the increase in the size of farms. However, percentage value of livestock decreased with the increase in the size of farms. (Table 5.11)

Table 5.11 Farm assets of the selected adoptor farms

Assets	Below 2.00 Value	%	2.00 to 4.00 Value	%	4.00 to 6.00 Value	%	6.00 to 8.00 Value	%	8.00 and above Value	%	Total Value	%
Land	13,000.00	72.04	87,000.00	79.25	206,000.00	79.63	107,000.00	86.63	750,000.00	86.21	11,63,000.00	84.28
Livestock	2,450.00	13.58	12,795.00	11.65	24,700.00	9.55	5.875.00	4.76	56,050.00	6.44	1,01,870.00	7.38
Implements & machinery	195.00	1.08	3,989.00	3.63	18,789.00	7.26	61,138.00	4.97	37,055.00	4.26	66,166.00	4.79
Building	2,400.00	13.30	6,000.00	5.47	9,200.00	3,56	4,500.00	3.64	26,900.00	3.09	49.000.00	3.55
Total	18,045.00	100.00	1,09,784.00	100.00	2,58,689.00	100.00	1,23,513.00	100.00	8,70,005.00	100.00	13,80,036.00 (100.00%)	

5.1.9 Land improvement works

The land improvements included

a. Sinking and construction of new wells and tube wells
b. Contour bunding
c. Laying of pipe lines
d. Paddy bunding
e. Deep ploughing

The total cost on all these works on the selected farms Rs. 1,17,395.00 on the other hand the area benefited by these works was 62.91 hectares. Thus the cost per hectare of all the land improvement works taken together amounted to Rs. 1,866.61. Individually the cost per hectare on sinking and construstion of new well and tube well was Rs. 3,437.32, on contour bunding Rs. 716.76, on laying pipe lines Rs. 679.43. Paddy bunding and deep ploughing cost 472.31 and Rs. 238.47 respectively. (Table 5.12)

Table 5.12 Land improvement works on the selected farms

Land improvement works	Total cost	Area benefited	Cost per hectare
Sinking and construction of new well/ tube well	102,267.00	29.75	3,437.32
Contour bunding	1,450.00	2,03	716.76
Laying pipe lines	1,100.00	1.62	679.43
Paddy bunding	11,197.00	23.72	472.31
Deep plcughing	1,381.00	5.79	238.47
All works	1,17,395.00	62,91	1,866.61

5.1.10 Sources of financing for land improvement works

The total financing required for various land development works was Rs. 1,17,395.00 Of the total amount Rs. 45,500.00 or 38.76 per cent came from Allahabad Bank. The cooperative banks were the second important source contributing 21.30 per cent of the total finance needed. The Government loans shared 17.92 per cent of the total amount.

A study of various sources within the size groups indicated that Allahabad bank and Cooperative Bank loans were utilised by third and fifth groups, Government loans were utilised by all the size groups but formed largest proportion in the size group of 2.00 to 4.00 hectares (75.72 per cent followed by the fourth group (73.41 per cent). (Table 5.13)

5.1.11 Net profit

The net profit per hectare was not related with the size of holdings. However, generally higher net profit per hectare was earned by the larger size groups. The heighest net profit per hectare of Rs. 1,276.18 was obtained by the largest size group and the lowest net profit Rs. 445.40 was gained by the smallest size group.

The net profit per farm increased with the increase in the size of farms. The net profit per farm was Rs. 6,538.16. The maximum net profit per farm was 16874.34 obtained by the largest size group and the lowest net profit per farm was Rs. 766.09 earned by the smallest size group. (Table 5.14)

Table 5.13 Sources of financing for land improvement works on the selected adopter farms

Sources	Below 2.00 Amount	%	2.00 to 4.00 Amount	%	4.00 to 6.00 Amount	%	6.00 to 8.00 Amount	%	8.00 and above Amount	%	Total Amount	%
Allahabad Bank	-	-	-	-	1650.00	62.31	-	-	29,000.00	43.00	45,500.00	38.76
Copoerative Bank	-	-	-	-	2000.00	7.55	-	-	23,000.00	34.10	25,000.00	21.30
Govt loan	200.00	50.00	14,567.00	75.72	2600.00	9.82	2650.00	71.43	931.00	1.38	21,038.00	17.92
State Bank	-	-	4,000.00	20.66	4,000.00	15.11	-	-	8,000.00	11.86	16,000.00	13.62
Owned fund	200.00	50.00	700.00	3.62	1,030.00	3.89	1060.00	28.57	6,367.00	9.44	9,357.00	7.97
Project	-	-	-	-	350.00	1.32	-	-	150.00	0.22	500.00	0.43
Total	400.00	100.00	19,357.00	100.00	26,480.00	100.00	3710.00	100.00	67,448.00	100.00	117,395.00	100.00

Table 5.14 Net profit per farm and per hectare by size groups

Size groups (in hectares)	Operated area (in hectares)	No. of farms	Net profit	Net profit/ farm	Net profit/ hect.
Below 2.00	5.16	3	2,298.28	766.09	445.40
2.00 to 4.00	23.06	8	14,075.50	1,759.44	,610.39
4.00 to 6.00	37.16	8	31,255.74	3,906.97	841.11
6.00 to 8.00	19.38	3	13,520.65	4,506.88	697.66
8.00 and above	105.78	8	1,34,994.75	16,874.34	1,276.18
Total	190.54	30	1,96,144.92	6,538.16	1,029.42

The average net profit per hectare on adopter farms was Rs. 1,029.42. The net profit per hectare for the adopters of 3 programmes was Rs. 401.80. It increased to Rs. 984.04 for these adopting four programmes. The net profit per hectare further increased to Rs. 1,129.75 for the farms adopting five programmes and was the highest (Rs. 1,630.63) for the farms having adopted 6 programmes.

It is evident that probability of farms per hectare increased with the adoption of every successive programme. It can be said that irrigation, fertilizer and high yielding varieties seeds played a comparatively more important role than the programmes like land development, agricultural machinery and plant protection. (Table 5.15)

5.1.12 Family Labour Income

The average family labour income per hectare was Rs. 1,175.45. The family labour income per hectare was not related with the size of holdings, although,

Table 5.15 Net profit per farm and per hectare, by number of programmes

Combination of programmes	Operated area (in hect.)	No of farms	Net profit	Net profit/ farm	Net profit/ hectr.
1,2,4,5,6,7	35.09	4	57,218.77	14304.69	1630.63
1,2,4,5,7	42.08	3	47,539.96	15846.65	1129.75
2,4,5,7	25.55	4	38,237.65	9559.41	1,496.58
2,4,5,6	4.25	1	5044.85	5044.85	1,187.02
1,2,4,7	12.94	3	11,217.42	3739.14	866.88
1,4,5,7	24.64	4	17,429.78	4357.45	707.38
1,4,5,6	4.86	1	3,786.55	3786.55	779.13
1,4,6,7	6.48	1	1,747.50	1747.50	269.68
Total of 4 programmes	78.72	14	77,463.75	5533.13	984.04
2,4,5	9.71	1	4766.15	4766.15	490.85
2,4,7	6.83	1	2878.40	2878.40	421.43
4,5,7	10.42	3	4171.89	1390.63	400.37
1,4,7	7.69	4	2106.00	526.50	273.86
Total of 3 programmes	34.65	9	13,922.44	1546.94	401.80
Total all programmes.	190.54	30	1,96,144.92	6538.16	1,029.42

generally higher family labour income was obtained by the larger size groups. The highest family labour income per hectare of Rs. 1,389.04 was earned by the largest size group and the lowest family labour income per hectare of Rs. 626.80 was gained by the smallest size group. (Table 5.16)

Table 5.16 Family labour income per farm and per hectare by size groups

Size groups	Operated area (in hectares)	No. of farms	Family labour income	Family labour income/ farm	Family labour income/ hecatre
Below 2.00	5.16	3	3,234.28	1,078.09	626.80
2.00 to 4.00	23.06	8	18,191.50	2,273.94	788.88
4.00 to 6.00	37.16	8	39,076.74	4,884.59	1,051.58
6.00 to 8.00	19.38	3	16,535.65	5,511.88	853.23
8.00 and above	105.78	8	1,46,932.75	18,366.59	1,389.04
Total	190.54	30	2,23,970.92	7,465.70	1,175.45

The family labour income per farm increased as the size increased. The average family labour income per farm was Rs. 7,465.70.

The family labour income per hectare for adopters of three programmes was Rs. 545.21. It increased to Rs. 1,161.79 for those adopting four programmes. The family labour income per hectare further increased to Rs. 1238.62 for the farms adopting five programmes and was the highest i.e. Rs. 1,752.72 for the farms adopting 6 programmes.(Table 5.17)

It shows that family labour income per hectare and per farm increased with the adoption of every successive programme.

Table 5.17 Family labour income per farm and per hectare by number of programmes

Combination of programmes.	Operated area (in hectares)	No of farms	Family labour income	Family labour income/farm	Family labour income/ hect.
1,2,4,5,6,7	35.09	4	61,502.77	15,375.69	1752.72
1,2,4,5,7	42.08	3	52,120.98	17,373.65	1238.62
2,1,5,7	25.55	4	42,425.35	10,606.41	1,660.50
2,4,5,6	4.25	1	5,851.85	5851.85	1,376.91
1,2,4,7	12.94	3	14,028.42	4,676.14	1,084.11
1,1,5,7	24.64	4	21,653.78	5,413.45	878.81
1,4,5,6	4.86	1	4,650.55	4,650.55	956.90
1,4,6,7	8.48	1	2,845.50	2,845.50	439.12
Total 4 programmes	78.72	14	91,455.72	6,532.55	1,161.79
2,4,5	9.71	1	5589.15	5,589.15	575.61
2,4,7	6.83	1	3742.40	3,742.40	547.94
4,5,7	10.42	3	5977.89	1,992.63	573.69
1,4,7	7.69	4	3582.00	895.50	465.80
Total 3 programmes	34.65	9	18,891.44	2,099.05	545.21
Total all programmes	190.51	30	2,23,970.89	7,465.70	1,175,45

5.1.13 Farm Business Income

The farm business income per hectare was also not related with the size of holdings. The average farm business income per hectare was Rs. 1,522.15. However, generally higher farm business income per hectare was earned by the larger size groups. The highest farm business income per hectare of Rs. 1,822.07 was obtained by the largest size group and the lowest farm business income per hectare of Rs. 783.80 was earned by the smallest size group. (Table 5.18)

Table 5.18 Farm business income per farm and per hectare by size groups.

Size groups (Hectares)	Operated area (in hect.)	No. of farms	Farm business income	Farm business income/ farm	Farm business income/ hect.
Below 2.00	5.16	3	4,044.43	1,348.14	783.80
2.00 to 4.00	23.06	8	24,624.62	3,078.08	1,067.85
4.00 to 6.00	37.16	8	52,191.08	6,523.89	1,404.50
6.00 to 8.00	19.38	3	22,148.10	7,382.70	1,142.83
8.00 and above	105.78	8	1,92,738.25	24,092.28	1,822.07
Total	190.54	30	2,95,746.48	9,858.22	1,522.15

The farm business income per farm increased with the increase in the size of farms. The average farm business income per farm was Rs. 9,858.22.

The farm business income per hectare for the adopters of three programmes was Rs. 849.89. It increased to Rs. 1,517.46 for the adopters of four programmes. It further increased to Rs. 1,537.65 for those adopting five programmes and highest farm business income per hectare was Rs. 2,340.81 obtained by the adopters of 6 programmes. (Table 5.19)

Table 5.19 Farm business income per farm and per hectare by number of programmes

Combination of programmes.	Operated area (in hectares)	No of farms	Farm business income	Farm business income/ farm	Farm business income/hect.
1,2,4,5,6,7	35.09	4	82,138.96	20,534.74	2,340.81
1,2,4,5,7	42.08	3	64,704.46	21,568.15	1,537.65
2,4,5,7	25.55	4	53,220.11	13,305.03	2,082.98
2,4,5,6	4.25	1	7,125.35	7,125.35	1,676.55
1,2,4,7	12.94	3	17,882.21	5,957.40	1,381.16
1,4,5,7	24.64	4	30,449.56	7,612.39	1,235.78
1,4,5,6	4.86	1	6,131.30	6,131.30	1,261.58
1,4,6,7	6.48	1	4,655.85	4,655.85	718.50
Total 4 programmes	78.72	14	1,19,454.38	8,532.46	1,517.46
2,4,5	9.71	1	9,667.15	9,667.15	995.59
2,4,7	6.83	1	5,844.50	5,844.50	855.71
4,5,7	10.42	3	8,126.52	2,708.84	779.90
1,4,7	7.69	4	5,810.51	1,452.63	755.59
Total 3 Programmes	34.65	9	29,448.68	3,272.08	849.89
Total All programmes	190.54	30	2,95,746.48	9,858.22	1,552.15

5.1.14 Input Out-put Ratio

The average input-output ratio was 1.77. The input-output ratio for the smallest size group was 1.64. It decreased to 1.49 in the second group.

Subsequently, the input-output ratio increased with the size of farms and was 1.92 in the largest size group. (Table 5.20)

The farm business income per hectare for the adopters of three programmes was Rs. 849.89. It increased to Rs. 1,517.46 for the adopters of four programmes. It further increased to Rs. 1,537.65 for those adopting five programmes and the highest farm business income per hectare was Rs. 2,340.81 obtained by the adopters of 6 programmes. (Table 5.19)

Table 5.20 Input-Output ratio by size groups

Size groups (in hect.)	Out put	Input	Input Output ratio
Below 2.00	5,909.65	3,611.37	1.64
2.00 to 4.00	42,596.19	28,520.70	1.49
4.00 to 6.00	85,176.30	53,920.56	1.58
6.00 to 8.00	34,270.00	20,749.35	1.65
8.00 and above	2,81,709.48	1,46,754.73	1.92
Total	4,49,701.62	2,53,556.71	1.77

The input-out put ratio for the adopters of three programmes was 1.34. It increased to 1.82 for the adopters of four programmes. It further increased to 1.95 for the adopters of five programmes. However, the input-out put ratio for the largest group decreased slightly and was 1.85. Thus it is evident that input-out-put ratio increased with the increase in the combination of programmes till those adopting 5 programmes. The ratio was, however lower for the adopters of largest number of programmes.(Table 5.21)

Table 5.21 Input-Output ratio by number of programmes

Combination of programmes.	Out-put	Cost-C	Input-Out put ratio.
1, 2, 4, 5, 6, 7,	124, 619. 13	67, 400. 36	1.85
1, 2, 4, 5, 7	97, 358. 90	49, 810. 94	1. 95
2, 4, 5, 7	73, 247. 30	35, 009. 65	2. 09
2, 4, 5, 6	10, 510. 00	5, 465. 15	1. 92
1, 2, 4, 7	28, 726. 25	17, 508. 83	1. 64
1, 4, 5, 7	43, 668. 29	26, 238. 52	1. 66
1, 4, 5, 6	8, 960. 00	5, 173. 45	1. 73
1, 4, 6, 7	7, 394. 00	5, 646. 50	1. 31
Total 4 programmes	172, 505. 84	95, 042. 10	1. 82
2, 4, 5	20, 037. 00	15, 270. 85	1. 31
2, 4, 7	11, 116. 50	8, 238. 10	1. 35
4, 5, 7	15, 702. 10	11, 611. 21	1. 36
1, 4, 7	8, 281. 15	6, 175. 15	1. 34
Total 3 programmes	55, 217. 75	41, 295. 31	1. 34
Total all programmes	449, 701. 62	253, 556. 71	1. 77

5.2 Non-adopter households

Non-adopter farmers were categorised in 5 groups according to size of holdings. Literacy, workers, land ownership, cropping pattern, structure of assets, net profit, family labour income, farm business income and input-output relationship was studied according to size groups.

5.2.1 Literacy

The average literacy percentage was 32.00 and the highest (40.00 per cent) literacy was observed in the fourth and fifth groups and the lowest (26.67 per cent) was seen in the first group.

The highest average of years of schooling was 9.33 and was claimed by the fifth group fallowed by 7.00, by the second group. (Table 5.22)

Table 5.22 Distribution of population of the non-adopter selected households

Size groups (in hectares)	Total No of persons	Total literates	Percentage of literacy	Total years of schooling	Average years of schooling
Below 2.00	45	12	26.67	81	6.75
2.00 to 4.00	17	6	35.29	42	7.00
4.00 to 6.00	18	6	33.33	38	6.33
6.00 to 8.00	5	2	40.00	12	6.00
8.00 and above	15	6	40.00	56	9.33
Total	100	32	32.00	229	7.16

5.2.2 Workers

The highest percentage of total workers 43.83 was obtained in the first group and the lowest (6.85 per cent) was seen in the fourth group. (Table 5.23)

Table 5.23 Distribution of workers of the non-adopter selected households

Size groups (in hectares)	Male		Female		Children		Total	
	No.	%	No	%	No	%	No	%
Below 2.00	15 (44.12)	46.88	12 (40.00)	37.50	5 (55.56)	15.62	32 (43.83)	100.00
2.00 to 4.00	4 (11.76)	36.36	5 (16.67)	45.46	2 (22.22)	18.18	11 (15.07)	100.00
4.00 to 6.00	7 (20.59)	46.67	6 (20.00)	40.00	2 (22.22)	13.33	15 (20.55)	100.00
6.00 to 8.00	3 (8.82)	60.00	2 (6.66)	40.00	-	-	5 (6.85)	100.00
8.00 and above	5 (14.71)	50.00	5 (16.67)	50.00	-	-	10 (13.70)	100.00
Total	34 100.00	46.58	30 100.00	41.10	9 100.00	12.32	73 100.00	100.00

5.2.3 Ownership of Land

The percentage of holdings purely owned was 80.00 and the holdings partially owned was 20.00. The holdings belonging to second, fourth and fifth groups were fully owned. In the remaining groups 66.67 per cent of the holdings were fully owned and 33.33 per cent holdings were partially owned. (Table 5.24)

Table 5.24 Ownership of operational holdings

	I		II		III		IV		V		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
Holdings purely owned	6	66.67	4	100.00	2	66.67	2	100.00	2	100.00	16	80.00
Holdings partially owned	3	33.33	-	-	1	33.33	-	-	-	-	4	20.00
Total	9	100.00	4	100.00	3	100.00	2	100.00	2	100.00	20	100.00

The percentage of area fully owned was 87.63 and partially owned was 12.37. The higher percentage of area fully owned was found in the higher groups . (Table 5.25)

5.2.4 Irrigation

There was no area irrigated on any of the non-adopter farms.

5.2.5 Cropping Pattern

The Cereals were dominant among crops and accounted for 71.32 per cent of the gross Cropped area, while pulses formed 23.21 per cent. Among the cereals wheat was the most important crop and occupied 39.84 per cent of the gross cropped area. Other important cereals were Kodon (15.20 per cent), paddy (8.29 per cent), Jowar (7.85 per cent) and barley (0.13 per cent). Among the pulses gram was the most important and occuped 11.65 per cent. Other important pulses were arhar (5.01 per cent), lentil (3.04 per cent), moong (2.93 per cent) and urd (0.58 per cent). The linseed

Table 5.25 Ownership of operational area.

	I Below 2.00		II 2.00 to 4.00		III 4.00 to 6.00		IV 6.00 to 8.00		V 8.00 and above		Total	
Holdings purely owned	8.31	65.28	11.53	100.00	10.12	70.08	12.55	100.00	19.39	100.00	61.90	87.63
Holdings partially owned	4.42	34.72	-	-	4.32	29.92	-	-	-	-	8.74	12.37
Total	12.73	100.00	11.53	100.00	14.44	100.00	12.55	100.00	19.39	100.00	70.64	100.00

Table 5.28 Net profit per farm and per hectare by size groups

Size groups (in hectares)	Operated area (in hect.)	No.of farms	Net proft	Net profit/ farm	Net profit/hect.
Below 2.00	12.73	9	5,463.32	607.04	429.17
2.00 to 4.00	11.53	4	6,129.40	1,532.35	531.60
4.00 to 6.00	14.44	3	3,430.70	1,143.57	237.58
6.00 to 8.00	12.55	2	3,944.12	1,972.06	314.27
8.00 & above	19.39	2	9,556.99	4,778.50	492.88
Total	70.64	20	28,525.60	1,426.28	403.82

5.2.8 Family Labour Income

The average family labour income per hectare was 545.78. The family labour income per hectare was highest (Rs. 645.90) in the largest size group and was lowest (Rs. 401.30) in the third size group. (Table 5.29)

Table 5.29 Family labour income per farm and per hectare by size groups

Size groups (in hect.)	Operated area (in hect.)	No. of farms	Family labour income	Family labour income/ farm	Family labour income/ hectare
Below 2.00	12.73	9	7,590.32	843.36	596.25
2.00 to 4.00	11.53	4	7,215.40	1,803.85	625.79
4.00 to 6.00	14.44	3	5,794.77	1,931.59	401.30
6.00 to 8.00	12.55	2	5,429.12	2,714.56	432.60
8.00 & above	19.39	2	12,523.99	6,262.00	645.90
Total	70.64	20	38,553.60	1,927.68	545.78

5.2.9 Farm Business Income

The average farm business income per hectare was Rs. 889.67. It was highest (Rs. 1139.96) in the largest size group and lowest (Rs. 744.69) in the third size group. (Table 5.30)

Table 5.30 Farm business income per farm and per hectare by size groups

Size groups (in hectares)	Operated area (in hect.)	No. of farms	Farm business income	Farm business income/ farm	Farm business income/ hect.
Below 2.00	12.73	9	9,905.58	1,100.62	778.13
2.00 to 4.00	11.53	4	10,059.06	2,514.77	872.42
4.00 to 6.00	14.44	3	10,753.32	3,584.44	744.69
6.00 to 8.00	12.55	2	10,024.57	5,012.29	798.77
8.00 & above	19.39	2	22,103.86	11,051.93	1,139.96
Total	70.64	20	62,846.39	3,142.32	889.67

The family labour income and farm business income increased with the size of farms. The net profit per farm also lowest in the first group and highest in the largest size group. However, no relationship was noticed between the net profit per farm and the intermediate groups.

5.2.10 Input-Output Ratio

The average input-output ratio was 1.47. It was highest (1.79) in the second group. The ratio decreased to 1.28 in the third group.

The relationship was not observed between the input-output ratio and the size of farms.

Table 5.31 Input-output ratio by size groups

Size groups (in hect.)	Out-put	Cost C	Input-output ratio
Below 2.00	17,644.12	12,180.80	1.45
2.00 to 4.00	13,891.00	7,761.60	1.79
4.00 to 6.00	15,737.50	12,306.73	1.28
6.00 to 8.00	14,342.00	10,397.88	1.38
8.00 & above	27,976.00	18,419.01	1.52
Total	89,590.62	61,066.02	1.47

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CHAPTER VI

RESULT AND DISCUSSION

Participant households are those who have participated in at least 3 or more than 3 programmes of the project.

The different programmes of the project are :-

1. Land improvement
2. Minor irrigation
3. Livestock improvement
4. Fertilizer use
5. Agricultural machinery
6. Plant protection/Preventive measures
7. Improved seed

The sample does not contain any farmer having adopted the programme for livestock improvement.

This total sample of 30 farmers include 9 farmers adopting 3 programmes, 14 farmers adopting 4 programmes, 3 farmers adopting 5 programmes and the remaining 4 with 6 programmes. The combinations of the programmes and the frequency distribution of such combinations are shown in Table 6.1. It may be noted that code numbers of the programmes in Col. 1 relate to the serial number of the programmes noted above.

In the following paragraphs the extent of adoption of the programmes has been discussed.

6.1 Extent of Adoption

The extent of adoption for different programmes has been calculated on different bases. Thus, in the

case of contour bunding the adoption has been calculated as the percentage of area contour bunded to the total area operated. In the case of paddy and haveli bunding the extent of adoption is arrived at by calculation of the percentage of area bunded to the area under respective crops.

In the case of deep ploughing and land levelling the extent of adoption equals the percentage of area developed under the programme to operated area. In the case of minor irrigation the percentage of irrigated area to the total operated area forms the basis for calculating the extent of adoption. In the case of fertilizers the extent of adoption has been calculated as the percentage of area fertilized to the area under the crop.

It may, however, be noted that this method has some limitations. For example, it is very difficult to ascertain the area which is benefited by the adoption of irrigation practice financed by the IDAD Programme and the one financed from own funds. Similarly in the case of fertilizers, it was not possible to ascertain the exact quantity obtained through IDAD aid and that obtained from other resources not only this but the break up of total quantity of fertilizers applied to different crops alongwith the source of fertilizers was also not possible to arrive at.

It has also not been attempted to allocate weights to different recommended practices and to arrive at one figure relating to the extent of adoption for a farmer, combining all the practices.

In the case of H.Y.V. the basis of adoption was the percentage of area under H.Y.V. to the area under the crop.

On the selected farms contour bunding was practiced to the extent of only 10.27 per cent.

Paddy bunding was done on practically entire area under the crop. In the case of haveli bunding the area benefited was found to be 58.60 per cent of the wheat area.

Deep ploughing was not common and the percentage of area benefited due to this programme was only 12.46 land levelling was another programme which did not appeal the farmers as the percentage area benefited was 12.55.

The percentage area benefited due to minor irrigation works was quite significant (44.60). Similarly, the percentage of area fertilized was quite high (86.98). H.Y.V.P. which is an integral part of the dry farming technology was also very well received by the selected farmers and the adoption of this programme was 61.43 per cent. (Table 6.1)

6.2 Farm resources per farm and per hectare on adopter and non-adopter farms

The value of farm resources per farm and per hectare was higher on adopter farms than the non-adopter farms. It was higher by Rs. 2,14,475.25 per farm on the former than latter. In other words it was higher by 87.55 per cent. The value of farm resources per hectare was higher by Rs. 298.27 or 4.30 per cent higher on adopter farms as compared to the non-adopter farms.

Table 6.1 Extent of adoption of different programmes on selected farms

Size groups	Land Improvement Works											
	Contour bunding			Paddy bunding			Haveli bunding			Deep ploughing		
	Total operated area	Area under contour bunding	%	Area under paddy	Area under paddy bunding	%	Area under wheat	Area under haveli bunding	%	Total operated area	Area under ploughing	%
Below 2.00	-	-	-	2.43	2.43	100.00	-	-	-	-	-	-
2.00 to 4.00	3.64	0.81	22.25	5.25	4.25	81.42	3.64	2.02	55.49	-	-	-
4.00 to 6.00	-	-	-	2.53	2.23	88.14	4.28	2.66	62.15	10.73	2.02	18.83
6.00 to 8.00	-	-	-	2.63	3.24	123.19	2.83	1.62	57.24	-	-	-
8.00 and above	12.14	0.81	6.67	3.64	5.06	139.01	-	-	-	56.82	6.40	11.26
Total	15.78	1.62	10.27	16.45	17.21	104.62	10.75	6.30	58.60	67.55	8.42	12.46

Table 6.1 contd.

Size groups	Land Improvement Works						Fertilizers			Improved Seed		
	Land levelling			Minor irrigation								
	Total operated area	Area under levelling	%	Total operated area	Area under minor irrigation	%	Area under the crop	Area fertilised	%	Area under crop	Area under H.Y.V.	%
Below 2.00	-	-	-	-	-	-	1.52	1.52	100.00	5.57	1.93	34.65
2.00 to 4.00	-	-	-	12.14	4.00	32.95	10.89	7.28	66.85	25.20	7.98	31.67
4.00 to 6.00	4.86	0.61	12.55	27.44	10.10	36.81	17.79	17.79	100.00	43.44	21.35	49.15
6.00 to 8.00	-	-	-	12.90	9.10	70.51	6.48	5.87	90.59	20.42	9.71	47.55
8.00 & above	-	-	-	87.21	39.10	44.83	53.54	46.01	85.94	120.78	52.61	43.56
Total	4.86	0.61	12.55	139.69	62.30	44.60	90.22	78.47	86.98	152.34	93.58	61.43

Table 6.2 Farm resources per farm and per hectare on adopter and non-adopter farms

Particulars	Adopter	Non-adopter	Higher income of adopters over non-adopters.	
			Rs.	%
Per farm	46,001.20	24,527.95	21,475.25	87.55
Per hectare	7,242.76	6,944.49	298.27	4.30

6.3 Farm incomes of adopters and non-adopters

Four criteria were used to compare the efficiency of farmings of the two types of farms. The criteria were, (a) Net profit per hectare (b) family labour income per hectare (c) farm business income per hectare (d) input-output ratio. The results are presented below.

6.3.1 Net Profit Per Hectare

The net profit per hectare on adopter farms was higher than the non-adopters by Rs. 625.60. The difference between the two categories varied from Rs. 16.23 to Rs. 783.30 in different size groups. In terms of percentage the adopter farmers earned 154.92 per cent higher net profit as compared to non-adopters. (Table 6.3)

Table 6.3 Net profit per hectare on adopter and non-adopter farms

Size groups (hectares)	Adopter	Non-adopter	Increase over Rs.	non-adopters percentage
Below 2.00	445.40	429.17	16.23	3.78
2.00 to 4.00	610.39	531.60	78.79	14.82
4.00 to 6.00	841.11	237.58	603.53	254.03
6.00 to 8.00	697.66	314.27	383.39	121.99
8.00 & above	1,276.18	492.88	783.30	158.92
Total	1,029.42	403.82	625.60	154.92

6.3.2 Family Labour Income Per Hectare

The family labour income per hectare on adopter farms was higher by Rs. 629.67 over the non-adopter farms. In other words it was 115.37 per cent higher. The range of higher family labour income was between Rs. 30.55 to Rs. 743.14 in different size groups. The range of percentage increase was between 5.12 to 162.04. (Table 6.4)

Table 6.4 Family labour income per hectare on adopter and non-adopter farms

Size groups (in hectares)	Adopter	Non-adopter	Increas over non-adopters	
			Rs.	Percentage
Below 2.00	626.80	596.25	30.55	5.12
2.00 to 4.00	788.88	625.79	163.09	26.06
4.00 to 6.00	1,051.58	401.30	650.28	162.04
6.00 to 8.00	853.23	432.60	420.63	97.23
8.00 & above	1,389.04	645.90	743.14	115.05
Total	1,175.45	545.78	629.67	115.37

6.3.3 Farm Business Income Per Hectare

On the basis of this criteria the adopter farms were ahead of non-adopter farms by a margin of Rs. 662.48. This indicated 74.46 per cent higher farm business income per hectare on the adopter farms. The difference between the incomes varied from Rs. 5.67 to Rs. 682.11 in the case of different size groups. (Table 6.5)

Table 6.5 Farm business income per hectare on adopter and non-adopter farms

Size group (in hectare)	Adopter	Non-adopter	Increase over non-adopters	
			Rs.	Percentage
Below 2.00	783.80	778.13	5.67	0.73
2.00to 4.00	1,067.85	872.42	195.43	22.40
4.00 to 6.00	1,404.50	744.69	659.81	88.60
6.00 to 8.00	1,142.83	798.77	344.06	43.07
8.00 & above	1,822.07	1,139.96	682.11	59.84
Total	1,552.15	889.67	662.48	74.46

6.3.4 Input-Output Ratio

Adopter farms prove to be conclusively better than non-adopter farms on the basis of this criteria also. While the input-output ratio for adopter farms was 1.77 that for non-adopters was 1.47.

Thus output per rupee of input was larger by 30 Paise or 20.41 per cent on adopter farms. (Table 6.6)

Table 6.6 Input-output ratio adopter and non-adopter farms

Size groups (in hectares)	Adopter	Non-adopter	Absolute increase(+) or decrease(-) of adopters over non-adopters	Percentage increase (+) of decrease(-) of adopters over non-adopters
Below 2.00	1.64	1.45	+ 0.19	13.10
2.00 to 4.00	1.49	1.79	- 0.30	- 16.76
4.00 to 6.00	1.58	1.28	+ 0.30	23.44
6.00 to 8.00	1.65	1.38	+ 0.27	19.57
8.00 & above	1.92	1.52	+ 0.40	26.32
Total	1.77	1.47	+ 0.30	20.41

6.4 Possibility of Adoption of Dryland Agricultural Practices

The foregoing paragraphs have undoubtedly proved that the benefits of adopting dry land practices are not only positive but also significant. Thus the net profit per hectare, family labour income per hectare, farm business income per hectare on adopter farms were higher by Rs. 625.60, Rs. 629.67 and Rs. 662.48 respectively than the non-adopter farms. Moreover, the input-output ratio was higher on adopter farms by 30 paise than the non-adopter farms.

It has also been seen that income of the farmers adopting only 3 programmes also edged over the non-adopters. The successive increase in the number of programmes adopted has resulted in the increase in the income.

As regards the possibility of adoption it was worth noting that all size groups could be brought under the benefiting enfluence of the programme. Thus, size of holdings would not act as hinderance in the participation of the programme.

Secondly, adoption of programmes does not necessitate a farmer to make huge investment. Some programmes need only a marginally higher investment.

Thirdly, the financial support given by the various agencies has made it possible for farmers hav ing a weak infrastructure to go in for the improved technology.

Lastly, the working of the programme for the last few years has amply demonstrated the technicalities of the programmes so that farmers have enough knowledge of the details of the programmes.

Therefore, there is every reason to believe that the possibility of adoption and further extension of programmes in the so for untouched areas is immense and the tools to achieve it are knowledge of the latest varieties/technology of the dry farming areas, extension activity, input and finance support and involment of the small farmers which predominate in the district.

On the basis of the interviews with the officials and the farmers following specific suggestions are offered to improve the adoption of the programmes :

9. The minor irrigation equipment viz, electric pumps and diesel pumps which are kept idle just for want of minor repairing should be get repaired and used for inrigating the crops.

10. The supply of electricity should be kept normal during the required irrigation periods.

11. The multiplied seeds of recommended varieties which have given better results under the local condition should be extended over the larger areas by the extension workers.

12. The extension workers should convince the farmers for using recommended doses of phosphatic fertilizers also alongwith nitrogenous fertilizers.

It has been revealed through the field experiments that water requirement of crops under unirrigated conditions is reduced by the use of only phosphatic fertilizers. Nitrogenous fertilizers, on the other hand require more number of irrigations than the phosphatic fertilizers. This should be tested and popularised if found practical.

13. The extension workers should persuade the farmers for adopting th maximum number of programmes to earn higher net profit.

14. Cotton Crop should be popularised in mair soil tract.

15. Pre-emergence and post-emergence weedicides should be supplied.

16. Financial assistance through the project should have special provision for the small and marginal farmers and subsidies and grants should be increased for them.

17. The produce of sunflower should either be purchased by Government agencies or Cooperatives. At present there is no adequate for this crop.

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CHAPTER VII

SUMMARY CONCLUSIONS AND SUGGESTIONS

In India dry farming areas constitute 36% of the total net sown area these are characterised by low rain fall and megre irrigation facilities. Since our production comes from these areas agricultural scientists have been trying to improve the lot of farmers by way of improved agricultural technology. In all the Five Year Plans due importance was accorded to this problem and in the Fourth Plan I.D.A.D. Projects were started all over the country. Madhya Pradesh is one of the important dry farming state as only 8.9 per cent of its area is under irrigation. Of the 26 dry farming districts of the state Indore and Rewa have got a main centre and sub centre respectively for the I.D.A.D. Project. The objective of the project is to introduce improved agricultural practices which would better the economic conditions of the farmers.

Land improvement, minor irrigation, livestock improvement, fertilizer use, agricultural machinery, plant protection and improved seed were the programmes taken up in this direction.

The objectives of the present study were to assess the extent of adoption of dry farming practices and to study the farm resources and income levels of adopter and non-adopter farms. It was also attempted to examine the possibilities of adoption of dry land practices on larger scale.

The cost of land improvement per hectare on the selected farms was Rs. 1,866.61 and the land improvements included sinking and construction of new wells, contour bunding, paddy bunding etc. Allahabad bank was the chief source of financing for land improvements and cooperative banks were second in importance.

Like adopter farms wheat was the most important crop on non-adopter farms as it occupied about 40 per cent of the cropped area. Kodon (15.20 per cent), Paddy (8.29 per cent) and jowar (7.85 per cent) were other important crops. Land was the principal item of assets constituting 86.60 per cent of the total value. Livestock accounted for another 7.92 per cent.

On the examination of the extent of adoption of the practices it was observed that contour bunding was practiced to the extent of 10.27 per cent. In the case of haveli bunding the percentage of adoption was 58.60. The percentage of area benefited due to deep ploughing was 12.46 and that due to land levelling, 12.55 per cent. The percentage of area benefited due to minor irrigation was 44.60. The area fertilized was also quite significant and formed 86.98 per cent of the total area. The adoption of H.Y.V.P. was to the extent of 61.43 per cent.

The value of farm resources per farm and per hectare was higher on the adopter farms than the non adopter farms.

The net profit per hectare on adopter farms was higher than the non adopters by Rs. 625.60. Family labour income per hectare was also higher on adopter farms. The difference was Rs. 629.67. Farm business income per hectare on adopter farms was higher by 662.42 than the non-adopter farms. It was also noted that input-output ratio was higher for adopter farms (1.77) than from non-adopter farms (1.47).

It was thus proved that benefits of adopting dry land practices were not only positive but also significant. It was also seen that successive increase in number of programmes adopted has resulted in increased income.

It can therefore be recommended that the farmers in the dry land farming areas be encouraged to adopt the recommended practices in view of acheiving their standrd of living and also the total social income of the country as well.

APPENDIX I

CONCEPTS AND DEFINITIONS USED

Reference year 1976-77

Operational holding

The area of land actually cultivated (including current fallow) by the farm family refers to operational holding which has been used also as synonymous to term 'farm'.

Gross Cropped Area

It is synonymous with total cropped area of the farm and is constituted of net area sown plus area sown more than once.

Farm family

It includes all members of the farm family irrespective of age and sex sharing common Kitchen, the adult falling in the age group 15-55 years and children below 15 years.

Farm workers

Includes farm family workers and permanent farm servants.

Man hour

One hour work by an adult male.

Man day

Eight hours work by an adult male taken equivalent to one work day or man day unit.

Animal labour day

Eight hours work done by a pair of draught Cattle. It also refers to bullock pair day.

Farm assts (Investment)

These include owned land, farm buildings (non-residential), well, livestock and implements and machinery.

Maintenance cost of draught animals

It includes value of feeds, labour on upkeep, medicine, ropes and interest on fixed and working capital i.e. Cattle and feeds.

Net maintenance cost

Gross maintenance cost minus value of dung and income from hiring out.

Working Capital

It includes value of human and bullock labour, manures, fertilizers, seeds, pesticides.

Output

Value of farm produce (main and by product) sold and consumed or held over by the family.

Cost concepts

Cost A

Covers cash and kind expenses and include the following: :-

a) Value of hired human labour

b) Value of owned and hired bullock labour.

c) Value of seeds both farm produced and purchased.

d) Value of fertilisers and manures both farm produced and purchased.

e) Depreciation on farm buildings, implements and machinery.

f) Irrigation charges.

g) Land revenue, cess, water rates and any other tax.

h) Interest on working capital.

Cost A 2:

Includes cost A, + rent paid for leased-in-land

Cost B :

Includes cost A_2 + rental value of owned land and interest on fixed capital excluding land.

Cost C:

Includes Cost B+imputed value of family labour.

Concepts of income

a) Gross income

Value of farm output from main as well as byproduct whether sold or utilised by the farm family.

b) Farm business income

Gross income minus cost A_2.

c) Family labour income

Gross income minus Cost B.

d) Net profit

Gross income minus cost C.

Evaluation and allocations

Evaluation of farm assets

a) Farm land evaluated at village price for different grades of land, i.e. sales in the village or in the neighbourhood.

b) Dwelling house cattleshed, storage/sheds and well etc. evaluated at village price at the time of evaluation.

c) Livestock evaluated at prevailing price in the village at the time of evaluation.

Evaluation of farm output

a) Crops evaluated at farm harvest price whether sold or consumed or retained by the family.

b) Milk evaluation as that of crops.

c) Fodder evaluation as that of crops.

Evaluation of inputs .

(a) Hired human labour

Evaluated as wages paid in cash and kind, kind payment converted into cash at prevailing rates in the village.

b) Family human labour

Evaluated at rates current in the locality for permanent labour.

c) Bullock labour

Evaluated at the rate of working cost per bullock pair day.

(d) Seeds:

Purchased seeds evaluated at price paid plus transport charges if any home produced seeds evaluated at current price for the seed prevailing in the village.

(e) Manures:

Cow dung manure if purchased at the price paid plus transport. Farm produced manure at the rate of Rs.10.00 per Cart load of 5 quintals as prevailed in the locality at the time of survey.

(f) Fertilizers and pesticides:-

Evaluated at the price paid plus transport cost.

(g) Depreciation:

Farm buildings: at the rate of 2% for masonary and 5% for non-masonary (structure to be observed)

Implements and machinery:

Evaluated at the rate of 10%. Cost of repairs is less than Rs.10.00 per implement added to depreciation and if more than Rs.10.00 per implement the entire cost of repair added to inventory value and depreciation estimated at that value.

Irrigation equipments:

Evaluated at the rate of 2% for tubewell and 10% depreciation was charged for electric and diesl pumps alongwith other implements.

Charges paid:

Rent paid for leased in land:

Evaluated in form of cash whether paid in cash or kind or both.

Irrigation charges:-

Evaluated at the rates paid for, tubewell, Electric pumps and Diesel. Pumps irrigation.

Rental value of owned land:

Evaluated at 5% of the value of land at village price.

Interest on working Capital

Evaluated at half of the 10% for kharif and rabi crops respectively and on borrowed at the actual rate of borrowing.

Interest on fixed capital.

Evaluated for agricultural assets excluding the value of land and milch animals at the rate of 6%.

Allocation of costs to crops and other enterprises

(a) Main and by product:

Cost of cultivation apportioned between main and byproduct in proportion to value of the two total value of output.

(b) Rent paid:

Allocation in proportion of the area under the crop.

(c) Rental value of owned land.

In proportion of area under the crop to Gross area sown of owned land.

(d) Interest:

In proportion of area under the crop to gross area sown.

(e) Manures:

Resedual effect no taken into account.

Reference:

Studies in the Economics of Farm Management in Deoria district in(Uttar Pradesh), Report for the year 1967-68, pub, 1973,PP 399 to 403.

Appendix- Table A-3.1 Details regarding selected villages

Particulars	Baijnath		Chorhata		Godahar		Kachur		Nauwasta	
	Place	Distance (km.)	Place	Distance (km.)	Place	Distance (km.)	Place	Distance (km.)	Place	Distance (KM)
Block	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Tehsil	Huzur	12	Huzur	8	Huzur	5	Huzur	12	Huzur	17
Post Office	Baijnath	-	Chorhata	-	Godahar	-	Kachur	-	Kachur	2
Telegraph office	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Police Station	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Hospital	Rewa	12	Chorhata	-	Rewa	5	Rewa	12	Rewa	17
Primary School	Baijnath	-	Chorhata	-	Godahar	-	Kachur Junior school upto VIII	-	Kachur	5
Middle School	Rewa	12	Chorhata	-	Rewa	5	"	-	Kachur	5
Higher Secondary School	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
College	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
V.L.W. Centre	Maddhepur	4	Chorhata	-	Padra	3	Kachur	-	Maddhepur	15
Patwari Centre	Baijnath	-	Chohata	-	Padra	3	Kachur	-	Maddhepur	15
Gram Panchayat Nyaya Panchayat.	Baijnath	-	Chohata	-	Godahar	-	Kachur	-	Maddhepur	15

Appendix Table - 3.1 contd.

Particulars	Baijnath		Chorhata		Godahar		Kachur		Nauwasta	
	Place	Distance (km.)	Place	Distance (km.)	Place	Distance (km.)	Place	Distance (km.)	Place	Distance (KM)
Weekly market	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Cooperative Bank	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Nationalised Bank	Rewa	12	Rewa	8	Rewa	5	Rewa	12	rewa	17
Land Development Bank	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
State Bank	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Cooperative Society	Maddhepur	4	Sahakari Samiti Chorhata	-	Ramkuinya	2	Cooperative Brihtakarsor Kachur	-	Kachur	5
Marketing Society	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Veterinary dispensary	Rewa	12	Rewa	8	Godahar	-	Kachur	-	Kachur	5
Cattle Market										
Fertilizer Distribution Centre	Rewa	12	Rewa	8	Ramkuinya	2	Kachur	-	Kachur	5
Seed Godown	Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17

3.1 contd.

Baijnath		Chorhata		Godahar		Kachur		Nauwasta	
Place	Distance (km.)	Place	Distance (km.)	Place	Distance (km.)	Place	Distance (k.m.)	Place	Distance (km.)
Centre									
Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
N.H.No.7	2	Rewa-Jabalpur N.H.NO.7	-	Rewa Chhijwar	-	Rewa Chhijwar	1	Rewa-Chhijwar	17
Vankuinya	13	Vankuinya	15	Rewa(Gird)	5	Vankuinya	5	Vankuinya	5
Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	17
Satna	34	Satna	44	Satna	52	Satna	65	Satna	68
la to Godahar	-	Chorhata-Kharia	-	-	-	Kachur	-	Nauwasta	-
Bela	2	Chorhata	-	Rewa	5	Kachur	1	Nauwasta	-
Bela	2	Chorhata	-	-	-	Kachur	1	Nauwasta	-
Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	12
Rewa	12	Rewa	8	Rewa	5	Rewa	12	Rewa	12

1 AREA UNDER HIGH YIELDING VARIETIES OF DIFFERENT CROPS

low Hect	2.00-4.00	4.00-6.00	6.00-8.00	8.00 & above	Total
	-	2.83	1.01	10.32	14.16
	2.23	2.63	0.61	7.89	13.36
	2.30	1.82	2.83	3.68	11.44
	-	0.91	1.21	6.27	8.39
	0.81	3.33	-	2. 67	7.21
	0.81	-	0.81	4.86	6.48
	-	3.64	-	1.62	5.26
30	-	1.62	-	-	1.92
	-	-	-	1.62	1.62
1	-	-	-	0.99	1.40
	0.41	-	-	0.81	1.22
	-	-	-	0.41	0.41
	-	0.20	-	-	0.20
	6.56	16.97	6.47	41.14	73.07
	0.20	0.51	2.02	2.02	4.75
	0.81	0.41	0.41	0.81	2.44
	-	-	-	0.91	0.91
	-	0.51	-	0.30	0.81
	0.41	-	-	-	0.41
	-	0.41	-	-	0.41
	-	-	-	0.41	0.41
	-	0.41	-	-	0.41
	1.42	2.25	2.43	4.45	10.55

Appendix Table : 5.1 Contd.

	Below 2.00 Hect.	2.00-4.00	4.00-6.00	6.00-8.00	8.00 & above	Total
Jowar						
Vidisha CH-5	-	-	-	-	0.41	0.41
Total	-	-	-	-	0.81	0.81
Arhar						
Prabhat	-	-	-	-	0.41	0.41
B.S. 1	-	-	0.10	-	-	0.10
Total	-	-	0.10	-	0.41	0.51
Pea						
Borvilla	-	-	-	-	0.41	0.41
Improved	-	-	-	-	0.04	0.04
Total	-	-	-	-	0.45	0.45

Appendix Table A 5.1 Contd.

	Below 2.00 Hect.	2.00-4.00	4.00-6.00	6.00-8.00	8.00 & above	Total
Urad						
Type-9	-	-	0.20	-	-	0.20
Mot-ichoor	-	-	-	-	0.20	0.20
Total	-	-	0.20	-	0.20	0.40
Moong						
T-29	-	-	0.20	-	-	0.20
Groundnut						
A.K. 1224	-	-	-	0.81	-	0.81
Jyoti	-	-	-	-	0.61	0.61
Gangapuri	-	-	0.20	-	0.10	0.30
Total	-	-	0.20	0.81	0.71	1.72
Sunflower						
E.C. 684-15	-	-	0.20	-	-	0.20

Appendix Table - 5.1 Contd.

	Below 2.00 Hect.	2.00-4.00	4.00-6.00	6.00-8.00	8.00 & above	Total
Laha						
6904	-	-	0.02	-	0.02	0.04
Vegetables						
Tomato						
Pusa Rubi	-	-	1.21	-	1.42	2.63
Brinjal (Long purple)	-	-	-	-	0.71	0.71
Chillies (M.P. 54)	-	-	-	-	0.51	0.51
Bhindi(H.Y.V.)	-	-	-	-	0.20	0.20
Potato (K-Alankar)	-	-	-	-	0.06	0.06
Sakarkand (H.Y.V.)	-	-	-	-	0.04	0.04
Total	-	-	1.21	-	2.94	4.15
Berseem(H.Y.V.)	-	-	-	-	1.48	1.48
Grand Total	1.93	7.98	29.35	9.71	52.61	93.58

B I B L I O G R A P H Y

1. Agrawal, R.C. and Shah, S.L. 1971 Extent of variability in selected dry farming districts of Uttar Pradesh, I.J.A.E.Vol. XXVI, No-4,P.350.

2. Das Gupta, H.K. 1971 Cost benefits study of lift irrigation under dry farming situation in Orissa, I.J.A.E.Vol. XXVI,No-4 P.363.

3. Desai, N.K. 1961 Problems of mixed farming study of charotor farm, I.J.A.E.Vol. XVI, July-Sept, PP. 46-50

4. Dhondyal, S.P. 1961 Economics of mixed farming in different regions, I.J.A.E.Vol. XVI,Jan-March, PP. 131-138.

5. George, M.V.and Gangwar A.C. 1971 Maximising returns from dry farming in Haryana State, I.J.A.E. Vol. XXVI No.4,P.369.

6. Gupta, S.B.Lal. 1964 Variability of yields, prices and income for selected crops in Varansi district (U.P.), I.J.A.E.Vol. XIX, No.-1, Jan-March,PP.92-96.

7. ICAR. 1970 A new technology for dry farming IGAR,New Delhi.

8. Jodha, N.S.and Purohit, S.D. 1971 Weather and crop instability in the dry regions of Rajasthan, I.J.A.E Vol XXVI,No.4, P 286.

9. Kahlon, A.S., etal. 1971 A comparative analysis of dry and irrigated farming in Ferozepur district, Punjab, I.J.A.E.Vol. XXVI No.4, P.318.

10. Kahlon, S.S. and Sandhu, H.S. 1971 Economic evaluation of dry farming in Punjab, I.J.A.E.Vol XXVI, No-4, P.334.

11. Nadkarni, M.V. 1971 Yield uncertainity in Maharashtra agriculture, I.J.A.E.Vol. XXVI,No.4, P.327.

12. Sarveswara Rao, B. 1976 Report on a study of Integrated dryland Agricultural development project, Hydrabad district, Andhra Pradesh, PP. 4-5.

13. Sen, S.R. 1967 Growth and instability in Indian Agriculture, Journal of Indian Society of Agricultural Statistics, Vol.XIX, No.1, PP 1-29.

14. Shukla, V.P. 1971 Income raising potentials on rainfed farms in Jabalpur district(M.P.) I.J.A.E.Vol.XXVI, No.4,P.354.

15. Singarey, M.K. 1971 Diversification of cropping to reduce instability in dry farming areas of Maharashtra, I.J.A.E. Vol. XXVI, No-4, P.36.

16. Singh, P. and Gupta D.D.1971 Economics of dry farming in Haryana State, I.J.A.E.Vol. XXVI No.4, P.300
