Study No. 95

STUDY FOR ESTIMATION OF SEED, FEED AND WASTAGE RATIOS FOR MAJOR FOODGRAINS OF MADHYA PRADESH

S.K. GUPTA

AGRO - ECONOMIC RESEARCH CENTRE
FOR MADHYA PRADESH AND CHHATTISGARH
JNKVV, JABALPUR (M.P.)
JULY, 2006

PROJECT TEAM

PROJECT LEADER

S.K. GUPTA

PRINCIPAL SCIENTIST

ASSOCIATES

B. S. PATEL	:	Technical Assistant
SRIKANT UPADHYE	:	Junior Computer

COMPUTER ANALYSIS

KAMTA PRASAD	:	Asst. Statistical Asstt.

PHOTOCOPYING

CHANDRAKANT MISHRA :

COMPUTER TYPING

SIKANDAR KHAN

PREFACE

The present study has been assigned by the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India to all the Agro-Economic Research Centres of the Country under the coordination ship of ADRT Unit, Institute for Social and Economic Change (ISEC). Bangalore. This Centre took up this study for the State of Madhya Pradesh.

The present study entitled "Study for estimation of seed, feed and wastage ratios for major foodgrains of Madhya Pradesh" was conducted for wheat and gram in two districts Rewa and Vidisha of Madhya Pradesh. The field data of this study were collected from 600 farmers comprises of 300 farmers for Wheat and 300 farmers for Gram respectively from Rewa and Vidisha districts of M.P. and analyzed crop-wise for wheat and gram.

The total wastage of foodgrains during harvest and post harvest stages is about 20 million tones in a year in our country. That is roughly the amount of foodgrains Australia produces annually. In a country like India, where about 26 per cent of the population lives below poverty line, these losses are a criminal wastage. There is no doubt that these losses can not be brought at the zero level but can be significantly reduced through better management and infrastructural facilities.

The present study was conducted by Dr. S. K. Gupta, Principal Scientist of this centre has conducted field investigation, tabulation and analysis, and drafted the report in the light of study design.

I wish to express my deep sense of gratitude to the officials of the Directorate of Economics and Statistics, Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India, New Delhi for entrusting this study to this Centre.

I extend my heartfelt thanks to the Coordinator of this study Professor R. S. Deshpande, Head ADRT Unit, ISEC, Bangalore who have provided necessary guidelines for conducting this study.

On behalf of the Centre, I express my deep sense of gratitude to Dr. D. P. Singh, Hon'ble Vice-Chancellor, Dr. V. S. Tomar, Director Research Services and Dean, Faculty of Agriculture, Dr. C. B. Singh, Director Extension Services, Dr. J. S. Raghu, Dean, College of Agriculture, and other officials of J. N. Krishi Vishwa Vidyalaya, Jabalpur for providing all facilities and help during various stages in successful completion of this study of high importance.

I express my sincere thanks to Director of Agriculture, Govt. of M.P., Bhopal, Directorate of Economics and Statistics, Bhopal, Mr. D. K. Dubey, Deputy Director of Agriculture, Vidisha, Mr. O. P. Jharvade, S.D.O. (Agriculture) Basoda, SADO's of

Nateran, Kurwai and Sironj blocks of Vidisha district, Dr.S.S.Parihar, Joint Director of Agriculture, Rewa, Dr.K.P.Pandey, Deputy Director of Agriculture, Rewa and SADO's of Raipur Karchulian, Sirmour, Rewa and Hanumana blocks of Rewa and other staff of the Department of Agriculture of both the districts for providing not only secondary data but also extending help in collection of field data from the selected farmers.

I am very thankful to the sample farmers for providing necessary information and cooperation during data collection.

In the A.E.R. Centre, Dr. S.K.Gupta, received constructive cooperation from Dr. H.O. Sharma, Mr. B.S. Patel, Mr. Shrikant Upadhye and Mr. Kamta Prasad by offering their best in completing the study. All the scientists and supporting staff members of Agro-Economic Research Centre and Department of Agricultural Economics & Farm Management deserve to be complemented for their untiring efforts in bringing this innovative study to its perfect shaped. I would also offer my thanks to Mr. Sikandar Khan who took painstaking job of doing the Computer typing of the report.

I hope the findings and suggestions made in this study would be useful to policy makers of the State and Government of India.

(**P. K. Mishra**)
Professor & Head

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CHAPTER- I

INTRODUCTION

1.1 Foodgrain Situation in India

India is a country of about one billion people. More than 70 per cent of India's population lives in rural areas where the main occupation is agriculture. In India, agriculture continues to be the engine of economic growth. Over the last century, productivity has been a major focus of agricultural research as feeding the population was the major concern. Due to the challenge of feeding our vast population and the experience of food shortages in the pre-independence era, "self reliance' in foodgrains has been the corner stone of our policies in the last 50 years, around 66 per cent of the total cultivated area is under foodgrains (cereals and pulses). Foodgrains production has increased fourfold since independence, from 51 million tonnes during 1950-51 to 212.85 million tonnes during 2001-02. The scourge of severe food shortage is now a thing of the past as is the dependence on imports. However, the fact remains that India achieved higher levels of productivity in foodgrains and per capita availability has increased from 395 grams in 1951 to 492 grams per day in 2002. (Govt. of India, 2004).

Of all the food articles, foodgrains constitute the most significant part of the Indian diet. Nearly 60 per cent of an average Indian's income gets spent on food grains. Self-sufficiency in foodgrains would, therefore, remain an integral part of Government Policy in times to come. The proposal to double food production would hence be primarily focussed on foodgrains. As per the report of the working group on "Demand and Supply Projections for the next plan" the consumption requirement for foodgrains during 2007 will be 233 million tonnes and the corresponding production requirement will be about 260 million tonnes inclusive of allowances for seed, feed and wastage. However, the target aimed at doubling food production has to be of a much higher order.

It may be mentioned that in the coming years the requirement for seed and allowances for wastage would be somewhat lower on account of technological development and scientific management of farm activities. On the other hand, there is a distinct possibility of higher demand for feed in view of expansion of livestock sector for the production of milk, eggs, meat and wool. However, only selected grades of foodgrains say maize, and pulses could be utilised as feed.

India is the second largest producer of rice and coarse cereals in the world. Our rank is third in wheat production. About one fourth of total world production of pulses is in India alone making us the largest producer of pulses. The production figures of important crops in India from 1951-52 to 2001-02 are given in (Table 1). The production of various agricultural commodities grown in the country has increased manifold over time. The production of foodgrains has increased (about 308 per cent) from about 52 million tonnes in 1951-52 to about 212 million tonnes in the year 2001-02. The production growth in the case of rice and wheat crops has been more spectacular as these crops witnessed a revolution in their production technology. The production of pulses have also increased (about 57 per cent) from 8.42 million tonnes to 13.19 million tonnes respectively during the corresponding period.

Table 1.1 Production of important crops in India (1951-52 to 2001-02)

(million tonnes)

Crops/ year	**1951-52**	**1971-72**		**1991-92**		**2001-02**	
Rice	21.30	43.07	(102.21)	74.68	(250.61)	93.08	(337.00)
Wheat	06.18	26.41	(327.35)	55.69	(801.13)	71.81	(1,061.97)
Coarse cereals	16.09	24.60	(52.89)	22.99	(61.53)	33.94	(110.94)
Pulses	8.42	11.09	(31.71)	12.02	(42.76)	13.19	(56.65)
Foodgrains	51.99	105.17	(102.29)	168.38	(223.87)	212.03	(307.83)

Note : Figures in parentheses indicate percentage increase over the year 1951-52

1.2 Foodgrains Situation in Madhya Pradesh

Significant progress and development in agriculture have taken place in Madhya Pradesh in the last couple of decades. Foodgrain production has more than doubled. The state of M.P. ranks first position in the country by contributing 14.6 per cent, 40.0 per cent, 20 per cent,60 per cent and 21 per cent of maize, gram, total pulses soybean and total oilseed's production respectively in the country. The state ranks second position in the case of masoor (lentil) production, third position in jowar production, fifth position in wheat and arhar production, seventh position in total cereal's production, eighth position in bajra and total foodgrains production and fourteens position in rice production (2002-03) (Table 2).

Table 1.2 State's share in National agriculture production and their status 2002-03

Crop Group	First Position		Second Position		Third Position		Position of M.P. if not in first three	
Crop	State	(%) Share	State	(%) Share	State	(%) Share	position	(%) Share
Total cereals	Uttar Pradesh	21.0	Punjab	14.4	West Bengal	9.4	Seventh	4.6
Total pulses	**M.P.**	19.8	Uttar Pradesh	18.5	Maharashtra	18.4	--	--
Total Foodgrains	Uttar Pradesh	20.8	Punjab	13.5	West Bengal	8.9	Eighth	5.6
Total oilseeds	**M.P.**	19.9	Maharashtra	15.5	Rajasthan	11.6	--	--
Rice	West Bengal	19.8	Punjab	12.2	Uttar Pradesh	11.2	Fourteenth	1.2
Jowar	Maharashtra	54.8	Karnataka	18.5	**M.P.**	7.9	--	--
Maize	**M.P.**	14.6	Andhra Pradesh	14.5	Karnataka	13.7	--	--
Bajra	Maharashtra	24.8	Gujrat	19.6	Uttar Pradesh	19.4	Eighth	2.4
Wheat	Uttar Pradesh	23.6	Punjab	14.2	Haryana	9.2	Fifth	4.3
Arhar	Maharashtra	35.3	Uttar Pradesh	13.6	Karnataka	10.9	Fifth	7.7
Gram	**M.P.**	39.2	Uttar Pradesh	18.9	Maharashtra	10.9	--	--
Masoor	Uttar Pradesh	53.3	**M.P.**	19.3	Bihar	18.2	--	--
Groundnut	Gujrat	25.0	Tamil Nadu	22.5	Andhra Pradesh	18.8	Seventh	2.8
Soybean	**M.P.**	56.6	Maharashtra	34.6	Rajasthan	5.3	--	--
Rape/ mustard	Rajasthan	33.4	Uttar Pradesh	19.4	Haryana	17.6	Fifth	5.4

Source : Agricultural Statistics at a Glance (2004), Deptt. of Agriculture, Govt. of M.P., Bhopal

1.3 Net availability of foodgrains per day

The net availability of foodgrains is defined as

NAF = GP – SFW- e + i + s

where, NAF = Net Availability of Foodgrains

GP = Gross Production of foodgrains

SFW = Seed, Feed and Wastages of foodgrains

e = Exports of foodgrains

i = Imports of foodgrains

s = Change in stock of foodgrains

The net availability of foodgrains divided by the population estimates for a particular year indicate per capita availability of foodgrains in terms of kg./year. Net availability, thus worked out further divided by the number of days in a year i.e. 365 days gives us net availability of foodgrains in terms of grams/day.

1.3.1 Availability of foodgrains in India

Due to increased foodgrains production, the net per capita availability of foodgrains increased from about 395 grams per day in 1951 to 455 gms/day in 2000 (Table-3). In the case of cereals, net per capita availability increased from about 334 gms/ day in 1951 to 423 gms/day in 2000. This was mainly due to increase in the availability of rice & wheat. The net per capita availability of pulses declined from about 61 gms/day in 1951 to 32 gms/day in 2000. These level of consumption of pulses remained significantly below the minimum nutritional norms of 70 gms/day prescribed by the Indian Council of Medical Research. Thus, availability fell short of the requirement by 53 per cent. The trend regression of the per capita availability of cereals and pulses (foodgrains) indicates that in the recent years, the growth rate has showed down in foodgrains and negative in pulses[1]. This has resulted in stagnancy in per capita availability of foodgrains. This was due to relatively stagnant of only marginal increase in the production and steady increase in population.

Table 1.3 Net availability of Foodgrains (Per day) from 1951 to 2003

(Grams per Capita per day)

Year	Rice	Wheat	Other Cereals	Cereals	Gram	Pulses	Foodgrains
1951	158.9	65.7	109.6	334.2	22.5	60.7	394.9
1960	187.8	78.3	118.0	384.1	27.7	65.5	449.6
1970	190.2	102.3	110.6	403.1	21.9	51.9	455.0
1980	166.1	126.8	86.6	379.5	10.7	30.9	410.4
1990	212.1	132.6	86.8	431.5	10.7	41.1	472.6
2000	203.7	160.0	59.0	422.7	10.8	31.8	454.4
2003(P)	183.4	178.9	44.9	407.1	8.3	29.1	436.3

Source : Agricultural Statistics at a Glance, Govt. of M.P. Bhopal, Year 2003

The recent slow down in the grain output raises concerns about the growth of agricultural sector. It has been estimated that India's demand for foodgrains in 2020 will be 351 million tonnes assuming 5.5 per cent growth in per capita income. If economic growth is also accompanied by significant reduction in the proportion of poor people, demand could further increase to 370 million tonnes by 2020. Therefore, the surging growth of demand for food must be met with largely through technological change in agriculture because of the limited option to expand the land area.

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1. Naik, Gopal and Thimmappa, K. (2001) Trends in agricultural output growth and prices of agricultural commodities, ***Agricultural Situation in India***, Vol. LVIII(5), pp-187

1.3.2 Requirement and availability of foodgrains in Madhya Pradesh

In Madhya Pradesh, the availability of foodgrains (cereals + pulses) is more than the requirement. The table 4 shows that the requirement of cereals, pulses and foodgrains per capita per year are 1.68 qt., 0.15 qt. and 1.83 qt. respectively, whereas, the availability are 2.09 qt., 0.56 qt. and 2.65 qt. per capita per year or 572.6 gms, 153.4 gms and 726.00gms per capita per day respectively.

Table 1.4 Per capita requirement and availability of foodgrains in Madhya Pradesh

S.No.	Items	Requirement per capita per year in quintals	Average requirement per capita per day in gram	Availability per capita per year in quintals	Net availability per capita per day in gram.
1	Cereals	1.68	460	2.09	572.6
2	Pulses	0.15	40	0.56	153.4
3	Foodgrains	1.83	500	2.56	726.0

Source : Compedium of Agricultural Statistics, 2002, Government of Madhya Pradesh, published by M.P. State Agricultural Marketing Board, Bhopal

1.4 Wastage or losses in foodgrains production

Safe storage of foodgrains is as important as production of foodgrains. However, storage losses still continue to be quite high in India. The state of Madhya Pradesh is no exception. In fact, storage losses in Madhya Pradesh are considered to be higher than the All-India average. This is so because storage facilities available in this state are far from satisfactory. Recognising this fact, the Department of Food of the Govt. of India in cooperation with the State Government launched the "Save Grain Compaign" (SGC) in Madhya Pradesh in 1973. This was intended to create awareness among rural masses about the extent of losses and a need for adopting scientific storage practices.

This programme (SGC) needs more attention of the Government so that every grain which is produced with a hard labour and high cost could be preserved and made available for consumption without affecting its quality and quantity[2].

Both quantitative and qualitative losses of extremely variable magnitude occur at all stages in the post harvest system from harvesting, (transportation, threshing, winnowing) through handling, storage, processing and marketing to final delivery to the consumer. The principal causes of these losses are physiological deterioration due to high temperature, low atmospheric humidity and damage due to physical injury, diseases and pests.

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2. Lal, Sone and B.P. Shrivastava (1985) Study of Impact of New Storage Technology in Madhya Pradesh ***Agricultural Situation in India***, Oct. 1985, pp. 629-631

Doubling production in 10 years will call for increasing the productivity and intensity of cropping. This will require use of high capacity precision equipment to reduce turn around time for timely farm operations, for utilising available soil moisture in dry land areas, increasing utilisation efficiency of costly inputs in agriculture of seed, fertilizer, irrigation water, pesticides etc. and for reducing losses during harvest and post harvest operations.

About 10 per cent of foodgrains and 30 to 40 per cent of the horticultural produce (fruits and vegetables) and appreciable percentage (10-12 per cent) of animal and fisheries produce get damaged/ spoiled due to non- availability of post harvest primary processing and value addition facilities at the levels of farmers, villages and towns[3].

1.5 Review on losses in stored foodgrains

The stored grain was the grain left with the farmers after procurement. This grain also included seed grain which remained with the farmers and whatsoever was left with the farmers was consumed as foodgrains.

Losses to stored foodgrains occur to varying extent under the conventional grain storage practices in the country. Krishnamurthy (1975) while reviewing the available information high lighted the various stages where losses occurred during the post harvest period. The Expert Committee of the Government of India (1966) on post- harvest losses estimated a loss of 9.33 per cent in storage and 2.55 per cent due to insect infestation in the country.

Several insect pests attack foodgrains in storage. These pests not only spoil the quality but also cause loss in weight due to weevilisation and the like. Earlier studies carried out in U.P. and Punjab give the idea of the extent of loss. Report of the weight loss in wheat due to weevils ranging to 2.5 per cent in six months were indicative of the extent of loss as back as 1937. While Rehman (1944) indicated a loss of two per cent, Pingale (1961), (1965) and (1966) suggested a loss of about 3.5 per cent in commercial storage in a period of eight months and 3 per cent in wheat during a period of six to eight months with the farmers. Subsequently Krishnamurthy (1968) and Ramasivan et al (1968) suggested storage losses of

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3. Paroda, R.S. (1998) "Strategies for doubling food production in India in next decade" ***Agricultural Situation in India***, Vol. LV(5) : pp 259

0.27, 1.31, 4.92 and 7.0 per cent during 2, 5, 8 and 12 months, respectively. Willson *et al* (1970) showed higher weight loss upto 2.7 per cent in four months and 6.2 per cent upto seven months in Punjab. Srivastava *et al* (1971) showed a loss of weight of 9.7 per cent in six months storage in U.P. villages. Later, Bhardwaj *et al* (1977) assessed weight loss of 2.5 per cent in eight to ten months of storage of wheat in Punjab. Similarly, Agarwal *et al* (1979) recorded loss in weight in stored wheat on periodic arrivals in Haryana markets varying from 0.60 to 4.01 per cent in three to nine months of storage.

All these studies give the rate of the quantitative losses but do not indicate the actual loss and its monetary value. Monetary loss was derived as the cost of the wheat grain lost as per support price of the year.

The study conducted by P.K. Srivastava (1985) indicated a loss of 1.09 per cent in Punjab and 2.23 per cent in Haryana. Thus, on an average about 1.66 per cent losses occurred in these two States. These estimates are quite nearer to those of the Expert Committee (1966) which indicated losses upto 2.5 per cent due to insect infestation.

1.6 Methodology used to estimate the State domestic product (State income) of Madhya Pradesh*

In the year 1999 the present series, apart from shifting the base from 1980-81 to the year 1993-94, many changes have been made in respect of both the data base and methodology adopted in estimation of Net State Domestic Product (NSDP), commonly known as State Income. State Domestic Product (SDP) is defined as the total value, at factor cost, of goods and services produced within the boundaries of the State which are either available for consumption and/or for addition to wealth. Thus, the State Domestic product of Madhya Pradesh includes all factor incomes originating within the boundaries of the State irrespective of the fact whether these are owned by persons living inside or outside the State. In other words, it excludes income originating in other States even though it may accrue to the residents of this State. It includes only those incomes of the residents of the State, whether individual or corporate, which are derived directly from current production of goods and services taking place within the State. Other forms of incomes which cannot be

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* "Estimates of State Domestic Product of Madhya Pradesh" Directorate of Economics and Statistics, Govt. of Madhya Pradesh, Bhopal (M.P.), Year 2004

attributed to the current services or to the production known as "transfer incomes' are not included in the State Domestic Product. At National level, the estimates of Net Domestic Product (NDP), i.e., income originating within the geographical boundaries of the country, are prepared. The net factor income received from the other countries is added to arrive at the Net National Product (NNP), known as "National Income". Due to non-availability of information on income flows amongst States, the estimates of Net State Product, corresponding to Net National Product cannot be prepared at the State level. In the present series, the estimates of Gross as well as Net State Domestic Product have been prepared broadly on the lines adopted at the National Level.

1.6.1 Detailed Methodology for preparing sector-wise Domestic Product

To prepare the estimates of Domestic Product from different sectors of the economy, mainly Production approach, Income approach or Expenditure approach is applied. After the calculation of sector- wise gross value added on the base year for current and constant prices, the 'FISIM' (Financial Intermediation Services Indirectly Measured) for the state, supplied by the Central Statistical Organisation is to be deducted to arrive at Gross Domestic Product. To obtain Net State Domestic Product, estimates of "Consumption of Fixed Capital" which are supplied by the Central Statistical Organisation for each sector deducted from the Gross State Domestic Product, except in the two sectors namely, Water Supply and Public Administration because the estimates for these two sectors are based on Net Income (salary and Wages) so Net State Domestic Product obtained, therefore, to arrive at Gross State Domestic Product the "Consumption of Fixed Capital" is added to Net State Domestic Product.

The following paragraphs give an account of the scope, sources of data used and methodology adopted in estimating the product under agriculture sector of the economy:

1.6.1.1 Agriculture

Production approach has been adopted in respect of agriculture sector (including livestock), However, income approach has been adopted in respect of irrigation.

Agriculture proper : The estimates of gross value of agricultural output are based on data on area and production of different crops. The data relating to area and production of crops are

available in the Final Forecast/Basic Agricultural Statistics published by the State Commissioner of Land Records & Settlement, Madhya Pradesh.

Gross value of output is obtained by multiplying the out-turn with the State level weighted average whole sale prices prevailing in primary markets. State level weighted average whole sale prices are based on whole sale prices collected during the peak marketing period by the State Commissioner of Land Records and the Directorate of Economics & Statistics, Madhya Pradesh under the "Market News Intelligence Scheme" District production figures have been used as weights.

In the case of some minor crops, the out-turn is not available. The value of such crop is estimated by applying the appropriate value of output of other suitable crop per hectare to the corresponding area of crop. The out-turn of by-products is estimated by using the rates/ratios supplied by the Central Statistical Organisation.

In the present series, Horticulture crops, which have been left unaccounted earlier, have been included. Similarly, Floriculture and production from kitchen garden for self-consumption are also included. Horticulture production and floriculture data available with the National Horticulture Board and data available with the results of 48th Round of National Sample Survey for Kitchen Garden have been used.

1.6.1.2 Livestock Products :

The estimates of production of different livestock products, e.g. milk, wool, eggs, meat, etc. as supplied by the Directorate of Veterinary Services, Madhya Pradesh have been used. With regard to the other livestock products, the estimates are prepared using the projected population of livestock based on the data collected through quinquennial livestock censuses by the Commissioner of Land Records and Settlement, Madhya Pradesh. The yield rates of different livestock products are used as supplied by the C.S.O. in the revised series.

The value of livestock products is obtained by evaluating the production at the average annual wholesale prices. These prices have been collected from District Livestock Officers by this Directorate.

To arrive at the gross product of the sector, gross value of output from Agriculture proper and livestock products are combined than the cost of inputs, e.g., seeds, fertilisers,

irrigation charges, diesel oil, cost of livestock feed, marketing charges, etc. and "FISIM' has been deducted. The "Consumption of Fixed Capital" is deducted from Gross Product to arrive at the Net Product.

The estimates at constant prices for agriculture sector including livestock are prepared by evaluating the production for each year by using the base year (1993-94) prices.

1.7 Need for the present Study

The total preventable (post harvest) losses of foodgrains are about 20 million tonnes in a year in our country. That is roughly the amount of foodgrains Australia produces annually. The foodgrains wasted in India during the year 1998-99 could have fed upto 117 million people for a year or the entire country for almost six weeks.

The foodgrain wastage at various stages in India during the year 1998-99 is shown in table 5. The total wastage was about 19 million tonnes, which could be fed to 1400 million people for a month. The maximum loss was by insects in storage (5.18 million tonnes) followed by rodents in field and storage (5.08 million tonnes), threshing losses (3.40 million tonnes), processing losses (1.87 million tonnes), birds picking (1.73 million tonnes), moisture in storage (1.38 million tonnes) and transportation (0.30 million tonnes).

Table 1.5 Foodgrain wastage at various stages in India.

Sr. No.	Points of wastage	Waste in million tonnes	Millions of people who could be fed for a month
1	Transportation	0.30	20
2	Moisture in storage	1.38	100
3	Birds pickings	1.73	130
4	Processing losses	1.87	140
5	Threshing losses	3.40	250
6	Rodents in field and storage	5.08	380
7	Insects in storage	5.18	380
Total		**18.94**	**1400**

Note : Estimates of waste are based on foodgrain production of 203 million tones during 1998-99. The calculation of number of people who could be fed is based on the assumption of net per capita cereal availability of 451 grams a day.

Source : Saran, Rohit (1999) Harvest of waste, India Today, Vol.24 (35) August 24-30, pp 62-64.

In a country like India, where about 26 per cent of the population live below poverty line, these foodgrains losses are a criminal wastage. There is no doubt that these losses can not be brought at the zero level but can be significantly reduced through better management and infrastructure.

Looking to the importance of study, the Ministry of Agriculture, Govt. of India asked the Agro-Economic Research Centres to conduct a study on the Estimation of Seed, Feed and Wastage Ratios for Major Foodgrains. The Agro-Economic Research Centres for M.P. and Chhattisgarh has taken up this study in Madhya Pradesh.

1.8 Objectives of the study

The present study on "Study for Estimation of Seed, Feed and Wastage ratios for major foodgrains of Madhya Pradesh" is taken up with the following objectives.

1. To estimate the total quantity of foodgrains consumed for seed, feed and wastage.
2. To estimate the net availability of foodgrains for human consumptions.

1.9 Organisation of the study report

The study report has been presented in five chapter in addition to this introductory chapter. Chapter-II deals with the profile of the selected state, districts and blocks. Methodology adopted in this study are presented in Chapter-III. Chapter-IV elaborates the results and discussions based on the findings of the study and concluding Chapter-V has Summary and Conclusions. References are also presented in the last.

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CHAPTER- II

GENERAL CHARACTERISTICS OF THE STATE, SELECTED DISTRICTS AND SELECTED REGIONS

For the purpose of field level study, two crops namely Wheat (cereal) from Rewa district and Gram (pulse) from Vidisha district of Madhya Pradesh were selected. A brief description for the State, districts and selected tehsils/ blocks would be useful.

2.1 Profile of the State of Madhya Pradesh

2.1.1 Location

The present State of Madhya Pradesh came into existence on 1st November 2000 when a separate State of Chhattisgarh was carved out of the old Madhya Pradesh. The present State of M.P. is surrounded by five states namely; Uttar Pradesh, Rajasthan, Gujarat, Maharashtra and Chhattisgarh, and is nearly centrally located in the country. The state is interspersed with hills, plateaus, plains and rivers. The State lies between latitudes21°53' to 22°59' north and longitudes 76°47' to 78°44' east. The total geographical area of the State is now 307.56 thousand sq. kms. which is 9.4 per cent of the total geographical area of the country. The State has 9 revenue divisions, 48 districts, 272 tehsils, 313 community development blocks, 394 town/ cities and 55,392 villages (Table 2.1).

2.1.2 Population

According to 2001 census, the total population of the State works out to 603.85 lakhs forming 5.88 per cent of the population of the country. Of this the male population is 314.57 lakhs (52.15 per cent of the total population) and female population, 289.28 lakhs (47.85 per cent of the total population).

The State is basically rural as 73.50 per cent of the population resides in villages. Conversely about one fourth (26.50 per cent) of the population is urban. The percentage of scheduled tribe population to total population works out to 20.27 per cent and similarly the percentage of scheduled caste population is 15.17 per cent. The decadal growth rate of population (1991-2001) works out to 24.34 per cent as against 21.34 per cent for the country as a whole.

Table 2.1 Profile of Madhya Pradesh State

S. No.	Particulars	Unit				
1.	**Location or situation**		Latitudes 21°53' to 22°59' N Longitudes 76°47' to 78°44' E			
2.	Geographical area (2002-03)	'000 sq.km.	307.56			
3.	Number of Districts	No.	48			
4.	Number of Tehsils	No.	272			
5.	Number of Blocks	No.	313			
6.	Number of Villages	No.	55,392			
7.	Rainfall (Annual)	m.m.	1,165			
			Number		Percentage to total population	
8.	**Total population** (2001 Census)	Lakh	603.85		100.00	
	(A) Male population	Lakh	314.57		52.15	
	(B) Female population		289.28		47.85	
	(C) Rural population	Lakh	443		73.50	
	(D) Urban population	Lakh	161		26.50	
	(E) Scheduled Castes population	Lakh	91.55		15.17	
	(F) Scheduled Tribes population	Lakh	122.33		20.27	
	Decadal growth rate(1991-2001)	Percentage	24.34		--	
9	**Classification of working population**	(2001 census)	Number		Percentage to total population	
	Total workers (main + marginal worker)		2,57,56,485		42.75	
	Main workers		1,90,77,568		31.66	
	Marginal worker		66,78,917		11.09	
					Percentage to total workers	
	Cultivator		1,10,58,500		42.93	
	Agricultural labour		73,80,878		28.66	
	Other workers		73,17,107		28.41	
10	**Density of population** (2001 census)	Per sq. km.	196			
11	Female/ Male **Sex Ratio**		920 / 1000			
12	**Percentage of Literacy** to total population (2001 census)	%	64.08			
13	Male Literacy Percentage	%	76.50			
14	Female Literacy Percentage	%	50.58			
15	Urban Literacy Percentage	%	79.67			
16	Rural Literacy Percentage	%	58.10			
17	**Classification of Holding**		**Number of holding**		**Size of holding** (Hect.)	
	A Marginal (below 1 hectare)		22,58,888	(34.43)	11,35,225	(6.88)
	B Small (1 -2 hectares)		17,07,388	(26.02)	24,37,021	(14.77)
	C Semi- medium (2 – 4 hectares)		14,17,050	(21.60)	39,29,120	(23.81)
	D Medium (4 -10 hectares)		9,71,335	(14.80)	57,87,622	(35.08)
	E Large (above 10 hectares)		2,06,574	(3.15)	32,10,937	(19.46)
Total			65,61,235	(100.00)	1,64,99,925	(100.00)

Average size of holding 2.51 Hect.

Note : Figures in brackets denotes percentage to total

Continued.....2

S. No	Particulars	Unit	Area	% to total geographical area
18	**Land Use Classification** (Year 2002-03)			
	A. Forest	Lakh Hect.	85.78	27.89
	B. Land not available for cultivation	"	33.07	10.76
	(i) Land put to non agricultural uses	"	18.90	6.15
	(ii) Barren and uncultivable land	"	14.17	4.61
	C. Other uncultivated land excluding fallow land	"	14.14	4.60
	(i) Permanent pastures and grazing land	"	13.95	4.54
	(ii) Land under misc. tree crops & groves	"	0.19	0.06
	D. Culturable Waste land	"	12.13	3.94
	E. Fallow land	"	16.22	5.27
	(i) Current Fallow	"	9.96	3.24
	(ii) Old Fallow	"	6.26	2.03
	F. Net area sown	"	146.21	47.54
	G. Area sown more than once	"	35.60	11.57
	H. Gross cropped area	"	181.81	59.11
	Total Geographical Area	"	307.56	100.00
19	**Cropping intensity**	(%)	124	

20	**Rabi Cropped Area** (Food crop + Non Food Crop)	Lakh Hect.	74.53	40.99%	Food 68.77	Non food 5.76
21	**Kharif Cropped Area** (Food crop + Non Food Crop)	Lakh Hect.	107.28	59.01%	49.36	57.92
	Total Food Crops	Lakh Hect.			118.13	64.97%
	Total Non Food Crops	Lakh Hect.			63.68	35.03%

22	Total Fertilizer Consumption	(Kg./ ha.)	48		
23	Area irrigated by different sources (2002-03)	Th. Hect.	Gross	Net	% to total Net irrigated area
	A. Canals	"	784.3	748.1	16.65
	B. Tanks	"	98.5	93.6	2.08
	C. Tubewells	"	1135.3	1109.8	24.69
	D. Wells	"	1941.1	1878.3	41.79
	E. Other Sources	"	671.8	664.5	14.79
24	Irrigated area	"	4631.0	4494.3	100.00
25	Area irrigated more than once	"	136.6		
26	Gross irrigated area	"	4631.0		
27	**Irrigation intensity**	%	103.04		
28	**Number of Agricultural implements (2002-03)**	Th. No. (1000)			
	(A) Plough i) Wooden plough ii) Iron plough		3218.10 527.51		
	(B) Bullock Carts		1316.54		
	(C) Electric Pump		1158.51		
	(D) Tractor		218.05		
	(E) Oil Engine		218.07		

Continued....3

29	**Livestock (2002-03)**	Number (in lakh)		Percentage to total
	Cattle (Cow, Bullock and Young stock)	"	176.28	(56.23)
	Buffaloes	"	61.69	(19.68)
	Sheep	"	7.35	(2.34)
	Goat	"	62.17	(19.83)
	Horse & Pony	"	0.53	(0.17)
	Mules	"	0.078	(0.02)
	Donkey	"	0.66	(0.21)
	Camel	"	0.083	(0.03)
	Pigs	"	4.65	(1.48)
	Total Livestock	"	313.50	(100.00)
30	**Poultry (2002-03)**		82.29	

31	**Cropping Pattern and Production and Productivity of Principal Crops (2002-2003)**					
	Crops	Area under crops ('000 ha.)	% to total cropped area	**Production**		**Productivity** (Kg./ ha.)
				('000 tonnes)	Position of M.P. in India	
	Paddy	1681.3	9.25	1032	14th	646
	Jowar	655.3	3.60	600	3rd	921
	Bajra	168.8	0.93	127	8th	744
	Maize	859.9	4.73	1494	1st	1751
	Kodo- kutki	381.0	2.09	78		200
	Wheat	3381.6	18.60	4923	5th	1520
	Barley	80.9	0.44	102		1257
	Other cereals & Millets	47.5	0.27	17		--
	Total Cereals	7256.30	39.91	8373	7th	1154
	Tur	303.50	1.67	188	5th	614
	Urad	521.00	2.86	146		279
	Gram	2470.60	13.59	1713	1st	694
	Lentil (Masoor)	467.00	2.57	181	2nd	387
	Pea	193.00	1.06	78		401
	Other pulses	196.50	1.08	71		--
	Total pulses	4151.60	22.83	2377	1st	575
	Total Foodgrain	11407.90	62.74	10750	8th	944
	Groundnut	208.10	1.14	131	7th	619
	Soybean	4190.50	23.05	2674	1st	638
	Sesamum	126.70	0.70	29		230
	Niger	103.30	0.57	18		169
	Rape and mustard	369.50	2.03	240	5th	650
	Linseed	142.40	0.78	50		353
	Other Oilseeds	22.6	0.13	2		--
	Total oilseed	5163.10	28.40	3144	1st	611
	Cotton	559.30	3.08	390	6th	351
	Sugarcane	68.90	0.38	208	11th	3991
	Other Fibers	6.60	0.04	-		-
	Fodder crop	625.50	3.44	-		-
	Spices	144.70	0.80	-		-
	Fruits	47.60	0.26	-		-
	Vegetables	144.20	0.79	-		-
	Others	13.50	0.07	-		-
	Total Cropped Area	18,181.3	100.00	-		-

Continued....4

32. Irrigated Crops (2002-03)				
Crops	Irrigated area (“000 ha.)	% to total irrigated area	Cropped area (‘000 ha.)	% of irrigated area to area under crops
Paddy	222.8	4.81	1681.3	13.25
Jowar	0.90	0.02	655.3	0.14
Maize	10.1	0.22	859.9	1.17
Wheat	2438.2	52.65	3381.6	72.10
Barley	33.3	0.72	80.9	41.16
Other cereals & Millets	0.1	Neg.	597.3	0.02
Total cereals	2705.4	58.42	7256.30	37.28
Gram	1068.7	23.08	2470.60	43.26
Tur	3.0	0.06	303.50	0.99
Other pulses	136.0	2.94	1377.50	9.87
Total pulses	1207.7	26.08	4151.60	29.09
Total foodgrains	3913.1	84.50	11407.90	34.30
Sugarcane	68.6	1.48	68.90	99.56
Total spices	109.1	2.35	144.70	75.40
Total fruits & vegetables	155.1	3.35	191.80	80.86
Total food crops	4245.9	91.68	11813.3	35.94
Groundnut	16.9	0.36	208.10	8.12
Sesamum	Neg.	--	126.70	Neg.
Soybean	21.8	0.47	4190.50	0.52
Sunflower	1.5	0.03	2.40	62.5
Rapeseed & mustard	126.3	2.73	369.50	34.18
Linseed	3.2	0.07	142.40	2.25
Other oilseeds	0.9	0.02	123.5	0.73
Total oilseeds	170.6	3.68	5163.10	3.30
Cotton	172.4	3.73	559.30	30.82
Fodder crops	33.7	0.73	625.50	5.39
Other nonfood crops	8.4	0.18	20.1	41.79
Total nonfood crops	385.1	8.32	6368.00	6.05
Total	4631.0	100.00	18181.3	25.47

Of the total population, 42.75 per cent population is within the category of total workers and remaining 57.25 per cent, non worker. The non workers include children and the old and infirm persons. The number of main workers is 31.66 per cent and marginal worker, 11.09 per cent. Of the total workers (2,57,56,485), 42.93 per cent are cultivators 28.66 per cent, agricultural labourers and remaining 28.41 per cent, other workers (Table 2.1)

The density of population is far below for the State (196) persons per sq. km. as compared to the all India average (324). The sex ratio (females per thousand males) was 920.

2.1.3 Literacy

In the matter of literacy, the state literacy percentage (64.05) has come up closer to All India average of 65.30 per cent. While in the matter of male literacy the state edged a bit better (76.50 per cent) than the country as a whole (75.85 per cent). In the case of female

literacy it lagged bit behind (50.58 per cent) the nation (54.16 per cent). The literacy in urban population is 79.67 per cent, whereas, it is 58.10 per cent in rural population (Table 2.1).

2.1.4 Operational holding

According to the Agricultural census, an area of 1,64,99,925 hectares was operated by 65,61,235 farmers in the state. Nearly 21.65 per cent area of the State was operated by 60.45 per cent marginal & small farmers. On the other hand, 54.54 per cent land was operated by only 17.95 per cent larger group of farmers (medium & large farmers). The average size of holding of the state is 2.51 hectares.

2.1.5 Land Use Classification

The total geographical area of the State was 307.56 lakh hectares. Nearly half (47.54 per cent) of it was net area sown. The area under forest formed 27.89 per cent, about 5.00 per cent less than the desirable proportion of 33.00 per cent. The area not available for cultivation formed 10.76 per cent. Besides this, area under other uncultivated land excluding fallow land formed 4.60 per cent, culturable waste land, 3.94 per cent and fallow land, 5.27 per cent. These categories of land are prone to loss due to various kinds of erosions including run off. It is, therefore, suggested that high priority be given to the conservation of land and water resources of the State. The gross cropped area of the state was 181.81 lakh hectares with a cropping intensity of 124 per cent.

Of the gross cropped area, rabi crops occupied 40.99 per cent and kharif crops, 59.01 per cent. Similarly, food crops occupied 64.97 per cent and non food crops, 35.03 per cent area of the gross cropped area. The consumption of fertilizer in the State is about 48 kg. per hectare (Table 2.1).

2.1.6. Irrigation

The net irrigated area of the State was 4494.3 thousand hectares. The main sources of irrigation were wells which contributed 41.79 per cent of the irrigated area. The next important sources of irrigation were tubewells and commanded 24.69 per cent of the irrigated area, followed by canals (16.65 per cent). Tanks contributed only 2.08 per cent, whereas,

other sources such as stop dams and irrigation done by fitting pumps on rivers, rivulets and nallahs formed 14.79 per cent. The gross irrigated area of the State was 4631.0 thousand hectares with a irrigation intensity of 103.04 per cent (Table 2.1).

2.1.7 Agricultural Implements

In the year 2002-03, the number of wooden plough in the State was 3218.10 thousands and iron plough, 527.51 thousand. The number of bullock carts was 1316.54 thousand, tractors, 218.05 thousands, electric pump 1158.51 thousand and oil engine 218.07 thousands.

2.1.8 Livestock and Poultry

The total livestock in the State numbered 313.50 lakhs. It comprised mainly of cattle (56.23 per cent), goat (19.83 per cent), buffaloes (19.68 per cent), sheep (2.34 per cent) and pigs (1.48 per cent). The number of poultry birds was 82.29 lakhs.

2.1.9 Cropping Pattern

The cropping pattern of the State was food crops oriented as this group of crops occupied 64.97 per cent of the gross cropped area. Among food crops the share of foodgrains was 62.74 per cent having only small proportions to crops like sugarcane, spices, fruits & vegetables. Among food crops 39.91 per cent area was occupied by cereals and 22.83 per cent by pulses. Among cereals, wheat occupied highest area (18.60 per cent) followed by paddy (9.25 per cent), maize (4.73 per cent) and Jowar (3.60 per cent). Similarly in the case of pulses, gram occupied 13.59 per cent area followed by urad (2.86 per cent) and lentil (2.57 per cent). Non food crops which occupied 35.03 per cent area of the gross cropped area mainly comprised of soybean which formed 23.05 per cent of the gross cropped area. While other oilseeds like rapeseed mustard (2.03 per cent), groundnut (1.14 per cent), cotton (3.08 per cent) and fodder (3.44 per cent) contributed to the rest non food crops area (Table 2.1).

2.1.10 Production and Productivity of Principal Crops

The important cereals of the State were paddy, maize, jowar and wheat. The major pulses of the State were gram, arhar, lentil, urad and pea. Among oilseeds, soybean, rapeseed and mustard, groundnut and linseed were important.

The production of paddy in the State was 1032 thousand tonnes and the yield per hectare was 646 kg. M.P. ranks 14th position in India in the case of paddy production. M.P. ranks 1st position in maize production (1,494 thousand tonnes) in India. In the case of jowar production (600 thousand tonnes), the position of M.P. is third. In the case of wheat production, the position of M.P. in the country is 5th M.P State ranks seventh in the case of total cereals production. The production of total pulses in the State was highest (2,377 thousand tonnes). In the case of pulses production, the State ranks first position. In the case of total foodgrains production (10750 thousand tonnes), the State ranks 8th position in the country. Among oilseeds, the major oilseed crop was soybean having 2,674 thousand tonnes production. The State of M.P. ranks first in soybean production. In the case of total oilseeds production (3144 thousand tonnes), the position of State is first.

Among cereals, the yield of paddy, jowar, bajra, maize, wheat and barley were 646, 921, 744, 1,751, 1,520 and 1,257 kg./hectares respectively. The yield of gram, tur, urad, lentil and pea were 694, 614, 279, 387 and 401 kg./hectares respectively. Among oilseeds, the yield of rapeseed mustard was highest (650 kg./ha) followed by soybean (638 kg./ha) groundnut (619 kg./ha.), linseed (353 kg./ha) and sesamum (230 kg./ha) (Table 2.1).

2.1.11 Irrigated Crops

The most important irrigated crop of the state was wheat which occupied 52.65 per cent of the irrigated area under all the crops. Gram was another important irrigated crop occupying 23.08 per cent. Paddy occupied 4.81 per cent followed by cotton (3.73 per cent), fruits and vegetables (3.35 per cent), rapeseed mustard (2.73 per cent) and spices (2.35 per cent) of the irrigated area.

If we note the percentage of irrigated area under a crop to gross area under the crop, it would be noted that wheat was irrigated to the extent of 72.10 per cent and gram was irrigated to the extent of 43.26 per cent. Paddy and barley were irrigated to the extent of 13.25 and 41.16 per cent respectively. In oilseeds, rapeseed mustard was irrigated to the extent of 34.18 per cent. Cotton was irrigated to the extent of 30.82 per cent. Some crops or crop groups although occupied smaller area were dependent on irrigation. Therefore, in such crops or crop groups the extent of irrigation was quite high. Such crop/ crop groups were sugarcane (99.56 per cent), spices (75.40 per cent), fruits and vegetables (80.86 per cent) and sunflower (62.50 per cent) (Table 2.1).

2.2 Profile of Rewa District

2.2.1 Location

Rewa district is located in the extreme northern part of the State. It lies between latitudes 24°18' to 25°12' north and longitudes 81°02' to 82°20' east. This district comes under "Kymore Plateau and Satpura Hills" agro climatic region. It is surrounded by Shahdol district in the South, Satna district in the west, Sidhi district in the east, and by Uttar Pradesh State in the north. The district occupied an area of 6,314 sq.km. It has 7 tehsils, 9 blocks, 827 village panchayats and 2,415 villages. The annual rainfall of the district ranged between 1000- 1400 mm.

2.2.2 Population

The total population of the district was 1972.33 thousands. It included 51.58 per cent male and 48.42 per cent females. It had 83.75 per cent rural population and 16.25 per cent urban population. Scheduled Castes and Scheduled Tribes formed 15.58 per cent and 12.88 per cent of the total population. The decadal growth rate (1991-2001) of population was 26.90 per cent. The density of population per sq.km. was 312. The sex ratio of females per thousand males was 939.

District population had 43.79 per cent total workers (main + marginal worker) of the total population. The percentage of main workers and marginal workers in the district were 29.69 and 14.10 per cent respectively. Among the various occupational categories, cultivators, agricultural labourers and other workers formed 43.39 per cent, 34.90 per cent and 16.97 per cent of the total workers respectively (Table 2.2).

2.2.3 Literacy

The literacy percentage of the district was 62.33 per cent. The percentage of literacy among urban population was higher (76.30 per cent) as compared to the rural population (59.47 per cent). The district had higher literacy among males (75.97 per cent) than females (47.83 per cent).

2.2.4 Land holding pattern

According to the Agricultural census (1995-2000), the total area under land holdings in the district was 4,36,870 hectares owned by 2,10,578 land holdings. Thus, the average size of land holding came to 2.07 hectares. On the basic of size, the land holdings have been

Table 2.2 Profile of Rewa District

S. No.	Particulars	Unit				
1.	**Location or situation**		Latitudes 24° 18' to 25°12' N Longitudes 81°02' to 82° 20' E			
2.	Geographical area	sq. km.	6314			
3.	Number of Village Panchayat	No.	827			
4.	Number of Tehsils	No.	7			
5.	Number of Blocks	No.	9			
6.	Number of Villages	No.	2415			
7.	Rainfall (Annual) (Average)	mm.	1000 - 1400			
8.	Agro-climatic Region & Crop Zone	--	Kymore plateau & Satpura Hills (Wheat zone)			
			Number ('000)	Percentage to total population		
9.	**Total population** (2001 Census)	No. in thousand	1972.33	100		
	(A) Male population	"	1017.40	51.58		
	(B) Female population	"	954.93	48.42		
	(C) Rural population	"	1651.86	83.75		
	(D) Urban population	"	320.47	16.25		
	(E) Scheduled Castes population	"	307.23	15.58		
	(F) Scheduled Tribes population	"	254.06	12.88		
	Population Decadal growth rate (1991-2001)		26.90	--		
9	**Classification of working population**	(2001 census)	Number	Percentage to total population		
	Total workers (main + marginal)	Number	863608	43.79		
	Main workers	"	585601	29.69		
	Marginal worker	"	278007	14.10		
				Percentage to total workers		
	Cultivator	"	374785	43.39		
	Agricultural labour	"	301399	34.90		
	Other workers	"	146575	16.97		
10	**Density of population** (2001 census)	Per sq. km.	312			
11	Female/ Male **Sex Ratio**		939/ 1000			
12	**Percentage of Literacy** to total population (2001 census)	%	62.33			
13	Male Literacy Percentage	%	75.97			
14	Female Literacy Percentage	%	47.83			
15	Urban Literacy Percentage	%	76.30			
16	Rural Literacy Percentage	%	59.47			
17	**Classification of Holding** Agril. Census (1995-2000)		**Number of holding**	%	**Size of holding** (Hect.)	%
	A Marginal (below 1 hectare)		1,07,043	(50.83)	44,802	(10.26)
	B Small (1 -2 hectares)		41,654	(19.78)	59,076	(13.52)
	C Semi- medium (2 – 4 hectares)		33,595	(15.96)	93,530	(21.41)
	D Medium (4 -10 hectares)		22,371	(10.62)	1,33,645	(30.59)
	E Large (above 10 hectares)		5,915	(2.81)	1,05,817	(24.22)
Total			2,10,578	(100.00)	4,36,870	(100.00)

* Average size of holding (Hect.) 2.07

Continued.....2

S. No	Particulars	Unit	Area	% to total geographical area
18	**Land Use Classification** (Year 2002-03)			
	A. Forest	('000 Hect.)	85.29	13.57
	B. Land not available for cultivation	"	92.85	14.77
	(i) Land put to non agricultural uses	"	59.97	9.54
	(ii) Barren and uncultivable land	"	32.88	5.23
	C. Other uncultivated land excluding fallow land	"	26.21	4.17
	(i) Permanent pastures and grazing land	"	24.54	3.90
	(ii) Land under misc. tree crops & groves	"	1.67	0.27
	D. Culturable Waste land	"	10.06	1.60
	E. Fallow land	"	45.80	7.28
	(i) Current Fallow	"	22.71	3.61
	(ii) Old Fallow	"	23.09	3.67
	F. Net area sown	"	368.53	58.61
	G. Area sown more than once	"	125.75	20.00
	H. Gross cropped area	"	494.28	78.61
	Total Geographical Area	"	(628.74)	100.00
19	**Cropping Intensity**	(%)	134	

20	**Rabi Cropped Area** (Food crop + Non Food Crop)	('000 Hect)	286.79	(58.02%)	Food 266.34	Non food 20.45
21	**Kharif Cropped Area** (Food crop + Non Food Crop)	('000 Hect)	207.49	(41.98%)	191.42	16.07
	Total Cropped Area	('000 Hect)	494.28	100 %	457.76	36.52

22	Total Fertilizer Consumption	(Kg./ ha.)			
23	**Area irrigated by different sources (2002-03)**	('000 Hect.	Gross Area	Net Area	% to total Net irrigated area
	A. Canals	''	14.50	14.30	15.82
	B. Tanks	''	1.50	1.50	1.66
	C. Tubewells	''	27.10	27.00	29.86
	D. Wells	''	31.10	30.10	33.30
	E. Other Sources	''	17.50	17.50	19.36
24	Total Net Irrigated Area	''	--	90.40	100.00
25	Area irrigated more than once	"	1.29		
26	Gross irrigated area	"	91.70		
27	**Irrigation intensity**	(%)	101.44		
28	**Number of Agricultural implements** (2002-03)	('000 No.)			
	(A) Plough i) Wooden plough ii) Iron plough	 '' ''	 138.94 0.78		
	(B) Bullock Carts	''	2.42		
	(C) Electric Pump	''	17.21		
	(D) Tractor	''	4.54		
	(E) Oil Engine	''	3.45		

Continued....3

29	**Livestock** (2002-03)	('000 No.)		% to total
	Cattle (Cow + Bullock)	"	729.63	65.50
	Buffaloes	"	167.49	15.04
	Sheep	"	21.96	1.97
	Goat	"	169.62	15.23
	Horse & Pony	"	0.48	0.04
	Mules	"	0.05	0.004
	Donkey	"	0.25	0.02
	Camel	"	0.14	0.01
	Pigs	"	24.35	2.18
	Total Livestock	"	1,113.97	100.00
30	Poultry (2002-03)	"	91.03	

31	**Cropping Pattern and Production and Productivity of Principal Crops** (2002-2003)				
	Crops	Area under crops ('000 ha.)	% to total cropped area	Production ('000 tonnes)	Productivity (Kg./ ha.)
	Paddy	140.70	28.47	96.20	720
	Jowar	15.90	3.22	10.90	688
	Bajra	0.60	0.12	0.22	402
	Maize	1.11	0.22	1.4	1234
	Kodo- kutki	9.00	1.82	2.5	280
	Wheat	167.90	33.97	193.0	1198
	Barley	5.40	1.09	3.2	598
	Other cereals & Millets	0.01	1.82	--	--
	Total Cereals	340.53	68.89	307.4	903
	Tur	11.89	2.40	4.36	367
	Urad	9.05	1.83	3.3	361
	Gram	65.34	13.23	66.5	1017
	Lentil (Masoor)	20.50	4.15	5.9	287
	Pea	0.60	0.12	0.30	451
	Other pulses	4.59	0.93	--	--
	Total pulses	111.97	22.66	82	733
	Total Foodgrain	452.50	91.55	389.4	861
	Groundnut	Neg.	--	Neg.	--
	Soybean	13.3	2.68	5.3	395
	Sesamum	2.40	0.49	0.4	172
	Niger	--	--	--	--
	Rape and mustard	2.7	0.55	0.9	324
	Linseed	17.2	3.48	4.1	236
	Other Oilseeds	0.47	0.22	--	--
	Total oilseed	36.09	7.42	11.7	328
	Cotton	--	--	--	--
	Sugarcane	0.063	0.01	0.11	--
	Other Fibers	--	--	--	--
	Fodder crop	0.074	0.01	--	--
	Spices	0.54	0.10	--	--
	Fruits	1.79	0.35	--	--
	Vegetables	2.86	0.57	--	--
	Others	0.37	--	--	--
	Total Cropped Area	494.28	100.00		

Continued....4

Irrigated Crops (2002-2003)				
Crops	Irrigated area ('000 ha.)	% to total irrigated area	Cropped area ('000 ha.)	% of irrigated area to Area under crops
Paddy	6.44	7.02	140.70	4.58
Jowar	--	--	15.90	--
Bajra	--	--	0.60	--
Maize	--	--	1.11	--
Kodo kutki	--	--	--	--
Wheat	77.08	84.06	167.90	45.91
Barley	0.36	0.39	5.40	6.67
Other cereals & Millets	0.01	0.01	--	--
Total cereals	83.89	91.48	340.53	24.63
Gram	4.15	4.52	65.34	6.35
Tur	--	--	11.89	--
Other pulses	0.20	0.22	--	--
Total pulses	4.35	4.74	111.97	3.88
Total foodgrains	88.24	96.23	452.50	19.50
Sugarcane	0.063	0.07	0.063	100.00
Spices	0.32	0.35	0.54	59.26
Fruits & Vegetables	2.63	2.87	4.65	56.56
Total food crops	91.25	99.51	--	--
Groundnut	--	--	Neg.	--
Sesamum	--	--	2.40	--
Soybean	--	--	13.3	--
Sunflower	--	--	--	--
Rapeseed & mustard	0.298	0.32	2.7	11.04
Linseed	Neg.	Neg.	17.2	--
Other oilseeds	Neg.	Neg.	--	--
Total oilseeds	0.306	0.33	36.7	0.83
Cotton	Neg.	Neg.	--	--
Fodder crops	0.08	0.09	0.08	100.00
Other nonfood crops	0.45	0.49	--	--
Gross Irrigated	91.70	100.00	494.28	18.55

grouped into five; marginal, small, semi medium, medium and large. It was noted that 70.61 per cent holdings belonging to marginal & small size group held only 23.78per cent of the total land. On the other hand, medium and large holdings together formed 13.43 per cent of the total number but these larger size holdings occupied disproportionately high percentage (54.81 per cent) of the total area (Table 2.2).

2.2.5 Land use classification

Of the total geographical area of 628.74 thousand hectares the net area sown was 58.61 per cent. The area under forest formed 13.57 per cent. The area not available for cultivation was 14.77 per cent followed by other uncultivated land excluding fallow land (4.17 per cent) and culturable waste land (1.60 per cent). Another category, 'fallow land'

formed 7.28 per cent of the total geographical area of the district. The double cropped area and gross cropped area of the district were 125.75 thousand hectares and 494.28 thousand hectares respectively. The cropping intensity was 134 per cent. The proportion of rabi crop and kharif crop were 58.02 per cent and 41.98 per cent respectively. Similarly, food crops and non food crops of the district covered 92.61 per cent and 7.39 per cent area of the gross cropped area (Table 2.2).

2.2.6 Irrigation Sources

Of the gross cropped area of 494.28 thousand hectare, 91.70 thousand hectare were irrigated. Therefore, percentage of irrigated area to gross cropped area was 18.55 per cent. The main sources of irrigation were wells which contributed 33.30 per cent of the net irrigated area of 90.40 thousand hectares. The next important sources of irrigation were tube wells and commanded 27.0 per cent followed by canals (14.30 per cent) and tanks (1.50 per cent). Other sources such as stop dams and irrigation done by fitting pumps on rivers, rivulets and nallahs formed 17.5 per cent. The irrigation intensity of the district was 101.44 per cent.

2.2.7 Agricultural Implements & Machinery

Majority of the farmers of Rewa district are using wooden plough (138.94 thousand) for cultivating the land followed by iron plough (0.78 thousand). There were 2.42 thousand bullock carts, 4.54 thousand tractors, 17.21 thousand electric pumps and 3.45 thousands oil engine, in the district. Majority of the farmers of the district using traditional method of cultivation.

2.2.8 Livestock

The total number of livestock in the district was 1,113.97 thousands. It included mainly of cattle (65.50 per cent), goats (15.23 per cent), buffaloes (15.04 per cent), pigs (2.18 per cent) and sheep (1.97 per cent). Poultry birds constituted 91.03 thousand numbers.

2.2.9 Cropping Pattern

The cropping pattern of the district was rabi dominated as this group of crops occupied 58.02 per cent of the gross cropped area. The cropping pattern was food crop oriented as it occupied 92.61 per cent area. The share of foodgrains was 91.55 per cent.

Among foodgrains, total cereals occupied 68.89 per cent and total pulses occupied 22.66 per cent of the gross cropped area. Among cereals, wheat and paddy were the important crops occupied 33.97 per cent and 28.47 per cent area of the gross cropped area respectively. Among pulses, gram was the main crop (13.26 per cent) followed by lentil (4.15 per cent) and tur (2.40 per cent). Among oilseeds, linseed occupied highest area (3.48 per cent) followed by soybean (2.68 per cent). The area under other crops were non significant (Table 2.2)

2.2.10 Production and Productivity of Crops

The major crops of the district were wheat, paddy, gram, jowar, linseed and soybean. In total production, share of these crops played very important role. According to merit, production of wheat crop was highest (193.0 thousand tonnes) followed by paddy (96.20 thousand tonnes), gram (66.50 thousand tonnes), jowar (10.90 thousand tonnes), soybean (5.30 thousand tonnes) and linseed (4.10 thousand tonnes).

The yield of wheat, the most important crop of the district, was 1,198 kg./hectare. The yield of paddy was 720 kg./ hectares. Among cereals, highest yield was observed in the case of maize (1234 kg./ hectares). In the case of pulses, highest yield was observed in gram (1017 kg./ hectare). Among oilseeds, soybean got highest yield (395 kg./ hectare) followed by rapeseed mustard, linseed and sesamum (Table 2.2).

2.2.11 Irrigated Crops

The gross irrigated area of the district in 2002-03 was 91.70 thousand hectares. The most important irrigated crop of the district was wheat which occupied 84.06 per cent of the gross irrigated area. Paddy occupied 7.02 per cent and gram, 4.52 per cent of the gross irrigated area.

Of the cropped area of 494.28 thousand hectares, 91.70 thousand hectares (18.55 per cent) were irrigated. Wheat was the crop irrigated to the extent of 45.91 per cent. In the case of other crop groups specially sugarcane, fodder crops, spices and fruits & vegetables although the area under these crop was very small, the extent of irrigation was very high.

2.3 Profile of Vidisha District

2.3.1 Location

Vidisha district is nearly centrally located. It lies between latitudes 23°20' to 24°22' north and longitudes 77°16' to 78°18' east. The district is surrounded by Sagar district in the east, Raisen district in the South, Bhopal district in the west and Guna district in the north and north- west. The district lies in the plateau with scattered hills with an elevation between 427 metres to 671 metres.

The total geographical area of the district was 7371 sq.km. It had 7 tehsils, 7 blocks, 549 village panchayats and 1,522 villages with a population of 1,214.86 thousands (2001 census). The annual rainfall of the district ranges between 1200- 1400 mm.

2.3.2 Population

Of the total population (1,214.86 thousand), 53.33 was male and the remaining 46.67 per cent, female. The percentage of rural population was 78.57, while the urban population formed only 21.43 per cent. Scheduled castes and scheduled tribes population formed 19.85 and 4.88 per cent of the total population. The remaining population belonged to other castes.

The decadal growth rate (1991-2001) of population was 25.19 per cent and density of population per sq.km. was 165. The sex ratio (number of females per 1000 males) was 876. The percentage of total workers to total population of the district was 37.12. Cultivators, agricultural labourers and other workers formed 37.60, 37.09 and 22.96 per cent respectively of the total workers (4,50,975).

2.3.3 Literacy

The literacy percentage of the district was 62.10. The percentage of literacy among urban population was higher (78.08 per cent) as compared to the rural population (57.53 per cent). Similarly the literacy percentage in male (74.71 per cent) was high as compared to female (47.45 per cent).

Table 2.3 Profile of Vidisha District

S. No.	Particulars	Unit				
1.	**Location or situation**		Latitudes 23^{o} 20' to 24^{o}22' N Longitudes 77^{o}16' to 78 ^{o}18' E			
2.	Geographical area	sq.km.	7371			
3.	Number of Village Panchayat	No.	549			
4.	Number of Tehsils	No.	7			
5.	Number of Blocks	No.	7			
6.	Number of Villages	No.	1522			
7.	Rainfall (Annual) (Average)	m.m.	1200-1400			
8.	Agro-climatic Region & Crop Zone	--	Vindhya plateau (Rice wheat zone)			
			Number ('000)	Percentage to total population		
9.	**Total population** (2001 Census)	No. in thousand	1214.86	100		
	(A) Male population	"	647.84	53.33		
	(B) Female population	"	567.02	46.67		
	(C) Rural population	"	954.49	78.57		
	(D) Urban population	"	260.37	21.43		
	(E) Scheduled Castes population	"	241.13	19.85		
	(F) Scheduled Tribes population	"	59.32	4.88		
	Population Decadal growth rate (1991-2001)		25.19	---		
10	**Classification of working population**	(2001 census)	Number	Percentage to total population		
	Total workers (main + marginal)	Number	4,50,975	37.12		
	Main workers	"	3,45,555	28.44		
	Marginal worker	"	1,05,420	8.68		
				Percentage to total workers		
	Cultivator	"	1,69,585	37.60		
	Agricultural labour	"	1,67,265	37.09		
	Other workers	"	1,03,558	22.96		
11	**Density of population** (2001 census)	Per sq. km.	165			
12	Female/ Male **Sex Ratio**		876 / 1000			
13	**Percentage of Literacy** to total population (2001 census)	%	62.10			
14	Male Literacy Percentage	%	74.71			
15	Female Literacy Percentage	%	47.45			
16	Urban Literacy Percentage	%	78.08			
17	Rural Literacy Percentage	%	57.53			
18	**Classification of Holding**		**Number of holding**	%	**Size of holding**	**%**
	A Marginal (below 1 hectare)		24,956	(20.36)	11,994	(2.22)
	B Small (1 -2 hectares)		27,536	(22.46)	40,772	(7.56)
	C Semi- medium (2 – 4 hectares)		29,150	(23.78)	83,588	(15.49)
	D Medium (4 -10 hectares)		29097	(23.73)	1,81,357	(33.61)
	E Large (above 10 hectares)		11,854	(9.67)	2,21,851	(41.12)
Total			1,22,593	(100.00)	5,39,562	(100.00)

* Average size of holding (Hect.) 4.40

Continued...

S. No	Particulars	Unit	Area	% to total geographical area
19	**Land Use Classification** (Year 2002-03)			
	A. Forest	('000 Hect.)	108.47	14.86
	B. Land not available for cultivation	"	45.89	6.28
	(i) Land put to non agricultural uses	"	36.26	4.96
	(ii) Barren and uncultivable land	"	9.63	1.32
	C. Other uncultivated land excluding fallow land	"	16.03	2.19
	(i) Permanent pastures and grazing land	"	15.94	2.18
	(ii) Land under misc. tree crops & groves	"	0.09	0.01
	D. Culturable Waste land	"	9.14	1.25
	E. Fallow land	"	8.70	1.19
	(i) Current Fallow	"	4.56	0.62
	(ii) Old Fallow	"	4.14	0.57
	F. Net area sown	"	541.97	74.22
	G. Area sown more than once	"	114.69	--
	H. Gross cropped area	"	656.66	--
	Total Geographical Area	"	(730.19)	100.00
20	**Cropping Intensity**	(%)	121.16	

					Food	Non food
21	**Rabi Cropped Area** (Food crop + Non Food Crop)	('000 Hect).	520.41	(79.25%)	517.45	2.96
22	**Kharif Cropped Area** (Food crop + Non Food Crop)	('000 Hect).	136.25	(20.75%)	17.64	118.61
	Total Food Crops + Non Food Crops Area ('000 hectares) (Percentage)				535.09 (81.49)	121.57 (18.51)
	Total Fertilizer Consumption	(Kg./ ha.)				

23	**Area irrigated by different sources (2002-03)**	('000 Hect.	Gross Area	Net Area	% to total Net irrigated area
	A. Canals	''	34.9	34.9	18.74
	B. Tanks	''	1.8	1.8	0.97
	C. Tubewells	''	62.9	62.9	33.78
	D. Wells	''	28.1	28.1	15.09
	E. Other Sources	''	58.5	58.5	31.42
24	**Total Net Irrigated Area**	''		186.2	100.00
25	**Area irrigated more than once**	"	NIL		
26	**Gross irrigated area**	"	186.2		
27	**Irrigation intensity**	(%)	100.00		
28	**Number of Agricultural implements** (2002-03)	('000 No.)			
	(A) Plough i) Wooden plough ii) Iron plough	''	 44.11 6.53		
	(B) Bullock Carts	''	19.64		
	(C) Electric Pump	''	16.08		
	(D) Tractor	''	14.44		
	(E) Oil Engine	''	24.62		

Continued.....

29	**Livestock** (2002-03)	('000 No.)		% to total
	Cattle (Cow + Bullock)	"	266.21	56.00
	Buffaloes	"	94.47	19.87
	Sheep	"	4.49	0.94
	Goat	"	101.66	21.39
	Horse & Pony	"	0.76	0.16
	Mules	"	0.14	0.03
	Donkey	"	1.98	0.42
	Camel	"	nil	
	Pigs	"	5.63	1.18
	Total Livestock	"	475.35	(100.00)
30	**Poultry (2002-03)**	"	120.79	--

31	**Cropping Pattern and Production and Productivity of Principal Crops (2002-2003)**				
	Crops	Area under crops ('000 ha.)	% to total cropped area	Production ('000 tonnes)	Productivity (Kg./ ha.)
	Paddy	0.70	0.11	0.20	321
	Jowar	7.85	1.19	7.7	976
	Bajra	--	--	--	--
	Maize	5.57	0.85	11.9	2147
	Kodo- kutki	--	--	--	--
	Wheat	232.96	35.48	308.7	1380
	Barley	0.40	0.06	0.60	1654
	Other cereals & Millets	0.42	0.06	--	--
	Total Cereals	247.90	37.75	329.4	1328
	Tur	0.86	0.13	0.5	537
	Urad	1.05	0.16	0.4	368
	Gram	202.17	30.79	124.5	616
	Lentil (Masoor)	67.90	10.34	30.7	452
	Pea	2.30	0.35	0.90	366
	Other pulses	5.62	0.85	--	--
	Total pulses	279.90	42.62	159.3	569
	Total Foodgrain	527.80	80.37	488.7	926
	Groundnut	0.66	0.10	0.70	1065
	Soybean	103.51	15.76	88.4	854
	Sesamum	0.06	0.01	0.02	339
	Niger	0.10	0.01	Neg.	146
	Rape and mustard	1.44	0.22	0.8	526
	Linseed	1.35	0.21	1.0	748
	Other Oilseeds	0.11	0.02	--	--
	Total oilseed	107.15	16.32	90.4	843
	Cotton	--	--	--	--
	Sugarcane	0.1	0.01	0.3	1811
	Other Fibers	0.04	0.006	--	--
	Fodder crop	14.40	2.19	--	--
	Spices	5.89	0.89	--	--
	Fruits	0.26	0.04	--	--
	Vegetables	1.56	0.24	--	--
	Others	--	--	--	--
	Total Cropped Area	656.66	100.00		

Continued.....

32 Irrigated Crops (2002-03)				
Crops	Irrigated area ("000 ha.)	% to total irrigated area	Cropped area ('000 ha.)	% of irrigated area to area under crops
Paddy	0	--	0.70	--
Jowar	0	--	7.85	--
Maize	0	--	5.57	--
Wheat	87.7	47.09	232.96	37.65
Barley	0.06	0.03	0.40	15.00
Other cereals & Millets	Neg.	--	--	--
Total cereals	87.76	47.12	247.90	35.40
Gram	85.40	45.85	202.17	42.24
Tur	0	--	0.86	--
Other pulses	11.09	5.95	--	--
Total pulses	96.49	51.81	279.90	34.47
Total foodgrains	184.26	98.93	527.80	34.91
Sugarcane	0.31	0.17	0.31	100.00
Spices	0.22	0.12	5.89	3.73
Fruits & Vegetables	1.28	0.69	1.82	70.33
Total food crops	186.07	99.91	535.61	34.74
Groundnut	--	--	0.66	--
Sesamum	--	--	0.06	--
Soybean	Neg.	--	103.51	--
Sunflower	--	--	--	--
Rapeseed & mustard	Neg.	--	1.44	--
Linseed	Neg.	--	1.35	--
Other oilseeds	Neg.	--	0.11	--
Total oilseeds	Neg.	--	107.15	--
Cotton	--	--	--	--
Fodder crops	0.12	0.06	14.40	0.83
Other nonfood crops	--	--	--	--
Total nonfood crops	0.17	0.09	121.57	0.14
Gross area	186.24	100.00	656.66	28.36

2.3.4 Operational Holdings

Vidisha district had 1,22,593 holdings with an area of 5,39,562 hectares. The average size of holding was 4.40 hectares. Of the total number of holdings, 20.36 per cent were marginal, 22.46 per cent small, 23.78 per cent semi medium, 23.73 per cent medium and 9.67 per cent large. Marginal and small holdings formed 42.82 per cent of the total number of holdings, but these occupied only 9.78 per cent of the area. On the other hand, big land holders (medium + large) formed 33.40 per cent of the total number of holdings but commanded a comparatively larger percentage of area (74.73) (Table 2.3).

2.3.5 Land Use

Of the total geographical area of 730.19 thousand hectares, 74.22 per cent was net area sown. Forest occupied 14.86 per cent and land not available for cultivation was 6.28 per cent. Other uncultivated land excluding fallow land was 2.19 per cent. Of this land, maximum area was under permanent pastures and grazing land. The area under culturable waste land was 1.25 per cent and fallow land formed 1.19 per cent. The gross cropped area of the district was 656.66 thousand hectares and net area sown was 541.97 thousand hectares. Rabi and kharif crops occupied 79.25 per cent and 20.75 per cent area of the total cropped area respectively. Of the gross cropped area, food crops and non food crops occupied 535.09 thousand hectares (81.49 per cent) and 121.57 thousand hectares (18.51 per cent) respectively. The cropping intensity was 121.16 per cent (Table 2.3).

2.3.6 Irrigation

The area under irrigation was 186.2 thousand hectares. Among the different sources of irrigation, tubewells were the most important and commanded 33.78 per cent of the net irrigated area. Canals commanded 18.74 per cent followed by wells (15.09 per cent) and tanks (0.97 per cent). The area irrigated by other sources formed 31.42 per cent. The percentage of net irrigated area to net sown area was 34.36 per cent. The irrigation intensity of the district was 100 per cent. (Table 2.3).

2.3.7 Agricultural Implements & machinery

The different agricultural implements & machinery used by the farmers of the district were plough, bullock carts, tractors, electric pump and oil engine. In 2002-03 the number of plough used by the farmers were; wooden plough (44.11thousand) and iron plough (6.53 thousand). The number of bullock carts and tractors were 19.64 thousand and 14.44 thousands. Total number of electric pumps and oil engine used by the farmers were 16.08 thousand and 24.62 thousand respectively. (Table 2.3).

2.3.8 Livestock

The total number of livestock in the district was 475.35 thousands. It included Cattle (56.00 per cent), goat (21.39 per cent), buffaloes (19.87 per cent), pig (1.18 per cent). Other

livestock, formed 1.56 per cent. Poultry birds also constituted significant (120.79 thousands) number in the district.

Dairying has immense scope in the district.

2.3.9 Cropping Pattern

Vidisha district was rabi crops dominated which covered 79.25 per cent of the gross cropped area. Food and non food crops covered 81.49 and 18.51 per cent respectively. Cereals and pulses dominated the cropping pattern. These two crop groups (total foodgrains) occupied 80.37 per cent of the gross cropped area. Oilseeds occupied 16.32 per cent area. Among other crops "fodder" occupied 2.19 per cent area.

Among cereals, wheat was the major cereal occupied 35.48 per cent area of the total area. Among pulses, gram occupied 30.79 per cent followed by lentil (10.34 per cent). Soybean was major oilseed crop of the district occupied 15.76 per cent of the gross cropped area. The cropping pattern of the district was food crops oriented.

2.3.10 Production and productivity of crops

The main crops of the district were wheat, maize, jowar, gram, lentil & soybean. The total production of cereals and pulses were 329.40 thousand tonnes and 159.30 thousand tonnes respectively. Oilseed production was 90.40 thousand tonnes. The production of wheat was highest (308.70 thousand tonnes) in the district followed by gram (124.50 thousand tonnes), soybean (88.40 thousand tonnes), lentil (30.70 thousand tonnes), maize (11.90 thousand tonnes) and jowar(7.70 thousand tonnes). Among cereals, the productivity was highest in maize (2147 kg./ha) followed by barley (1654 kg./ha) and wheat (1380 kg./ha.). The productivity of gram (616 kg./ha) was highest followed by tur (537 kg./ha), lentil (452 kg./ha), urad (368 kg./ha) and pea (366 kg. ha). In the case of oilseeds, groundnut got highest yield (1065 kg./ha), although the area and production was very low. The yield of soybean was 854 kg./ha followed by linseed (748 kg./ha), rapeseed mustard (526 kg./ha.) and sesamum (339 kg./ ha.).

2.3.11 Irrigated Crops

In Vidisha district, the most important irrigated crop was sheat which occupied 47.09 per cent of the irrigated area under all the crops. Gram was another important irrigated crop occupying 45.85 per cent.

Wheat and gram were the crops irrigated to a large extent. Gram was irrigated to the extent of 42.24 per cent followed by wheat (37.65 per cent). Sugarcane and fruits & vegetables were the other crops irrigated to the extent of 100 per cent and 70.33 per cent, but the area under these crops was not significant. Therefore, in such crops or crop groups the extent of irrigation was quite high (Table 2.3).

2.4 Profile of selected tehsils/ blocks of Rewa District

2.4.1 Location :

For this study, four tehsils/ blocks of Rewa district having maximum area under wheat (cereal) were selected. The name of these selected tehsils/ blocks are; Raipur karchuliyan, Sirmour, Hanumana and Rewa (Huzoor). The location of these selected tehsils/ blocks are presented in table 2.4. Among the selected tehsils of Rewa district the geographical area of Sirmour tehsil was highest (1,504.5 sq.km.) followed by Hanumana tehsil (960.7 sq.km.), Rewa tehsil (704.2 sq.km.) and Raipur Karchuliyan tehsil (628.1 sq.km.). The average annual rainfall of these selected tehsils/ blocks ranges from 1,334 m.m. to 1,572 m.m.

Table 2.4 Geographical situation of Rewa (Cereal) district and selected tehsils/ blocks (2004)

S. No	District/ Tehsil/ Block	Latitudes (N)	Longitudes (E)	Height from Sea level (mtr.)	Geographical area (Sq. Km.)	Average Annual Rainfall (m.m.)
1	Rewa District	24^o 18’ to 25^o 12’N	81^o 02’ to 82^o 20’E	715	6,287.5	1,439
2	Raipur (K) Tehsil and Block	24^o 31’ to 24^o 41’N	81^o 23’ to 81^o 41’E	715	628.1	1,353
3	Sirmour Tehsil and Block	24^o 36’ to 25^o 00’N	81^o 02’ to 81^o 40’E	715	1,504.5	1,334
4	Hanumana Tehsil & Block	24^o 34’ to 24^o 51’N	81^o 55’ to 82^o 20’E	715	960.7	1,492
5	Rewa (Huzoor) Tehsil & Block	24^o 18’ to 24^o 43’N	81^o 08’ to 81^o 23’E	741	704.2	1,572

2.4.2 Land use classification

The total geographical area of Raipur (K) tehsil / block was 62.81 thousand hectares. Forest occupied 9.55 per cent area. Nearly 65.90 per cent area was under net cultivation. Besides this, the land not available for cultivation formed 13.48 per cent and fallow land, 5.89 per cent. The gross cropped area and net sown area were 56.34 and 41.39 thousand hectares respectively. The cropping intensity was 136 per cent. In Sirmour tehsil, the forest occupied 14.96 per cent area of the total geographical area of 150.45 thousand hectares. Nearly 12 per cent area was not available for cultivation. The gross cropped area and net sown area were 124.48 and 93.82 thousand hectares respectively. The cropping intensity was 132.68 per cent. The geographical area of Hanumana tehsil/ block was 96.07 thousand hectares, of which forest occupied 12.35 per cent. Nearly 16 per cent area was fallow and similar area was not available for cultivation. The intensity of cropping in Hanumana was 138.16 per cent. In Rewa tehsil, forest occupied 12.31 per cent area of the total geographical area of 70.42 thousand hectares. Nearly 14 per cent land was not available for cultivation. Fallow land and culturable waste land occupied 4.76 per cent and 0.44 per cent of the geographical area. The total cropped area of this tehsil was 58.12 thousand hectares followed by 43.72 thousand hectares under net cultivated area. The cropping intensity was nearly 133 per cent (Table 2.5).

2.4.3 Population

The population of 4 selected tehsils of Rewa district are given in table 2.6. Among selected 4 tehsils, Sirmour got highest population (4,48,905) followed by Rewa (3,96,128), Hanumana (2,06,392) and Raipur (K), 1,24,793. The density of population was highest in Rewa tehsil/ block (600 per sq.km.) followed by Sirmour (298), Hanumana (215) and Raipur (K) 189. In all the tehsils, the percentage of male population was more as compared to female population. The percentage of scheduled caste population was more as compared to scheduled tribe in Raipur (K), Sirmour, and Rewa (Huzoor) tehsil whereas, in Hanumana tehsil the number of scheduled tribe was more as compared to scheduled caste population. The decadal growth rate of population (1991 to 2001) was highest in Rewa (Huzoor) tehsil (34.85 per cent) followed by Raipur (K), Hanumana and Sirmour tehsil.

Table 2.5 Land Use Classification (Selected Tehsils and Blocks of Rewa (Cereals) District) (2003-04)

(Thousand hectares)

S. No.	Particulars	Raipur (K) Tehsil and Block	Sirmour Tehsil and Block	Hanumana Tehsil and Block	Rewa (Huzoor) Tehsil and Block
1	Total Geographical Area	62.81 (100.00)	150.45 (100.00)	96.07 (100.00)	70.42 (100.00)
2	Forest	6.00 (9.55)	22.51 (14.96)	11.87 (12.35)	8.67 (12.31)
3	Land not available for cultivation	8.47 (13.48)	17.98 (11.95)	15.53 (16.16)	9.84 (13.97)
4	Other unculturable land excluding fallow	1.48 (2.36)	9.12 (6.06)	3.51 (3.65)	4.53 (6.43)
5	Culturable waste land	1.77 (2.82)	0.06 (0.04)	2.65 (2.76)	0.31 (0.44)
6	Fallow land	3.70 (5.89)	6.96 (4.63)	15..50 (16.13)	3.35 (4.76)
7	Net Sown Area	41.39 (65.90)	93.82 (62.36)	47.01 (48.93)	43.72 (62.08)
8	Area sown more than once	14.95	30.66	17..94	14.40
9	Gross Cropped Area	56..34	124.48	64..95	58.12
10	Cropping Intensity (%)	136.12	132.68	138.16	132.94

Table 2.6 Population of the selected tehsils of Rewa (cereals) District (Census – 2001)

S. No.	Particulars	Raipur (K) Tehsil	Sirmour Tehsil	Hanumana Tehsil	Rewa (Huzoor) Tehsil
1	Total Population (Number)	1,24,793	4,48,905	2,06,392	3,96,128
2	Density of population (Per sq.km.)	189	298	215	600
3	Male Population (Number)	63,536 (50.91)	2,28,377 (50.87)	1,05,374 (51.06)	2,09,310 (52.84)
4	Female Population (Number)	61,257 (49.09)	2,20,528 (49.13)	1,01,018 (48.94)	1,86,818 (47.16)
5	Schedule Caste Population (Number)	21,254 (17.03)	72,964 (16.25)	30,107 (14.58)	53,265 (13.44)
6	Schedule Tribes Population (Number)	12,796 (10.25)	55,653 (12.39)	41,473 (20.09)	28,711 (7.24)
7	Population decadal growth rate (Per cent) (1991 – 2001)	26.56	23.96	25.78	34.85

Note : Figures in brackets denotes percentage to total population

2.4.4. Working Population

Of the total population of Raipur (K) tehsil, about 41 per cent are workers and the remaining 58.69 per cent, non worker. The non workers include children and the old and infirm persons. In all the tehsils, the percentage of non- working population was more as compared to working population. The percentage of cultivators was maximum (16.90) in Hanumana and lowest (7.85) in Rewa tehsil (Table 2.7).

Table 2.7 Classification of working population of selected tehsil/ blocks of Rewa (Cereal) District

S. No.	Particulars	Raipur (K) Tehsil & Block	Sirmour Tehsil & Block	Hanumana Tehsil & Block	Rewa (Huzoor) Tehsil & Block
1	Cultivators	25,543 (15.47)	52,669 (14.54)	27,602 (16.90)	23,058 (7.85)
2	Agricultural Labourers	23,710 (14.36)	44,466 (12.28)	19.563 (11.98)	25,528 (8.69)
3	Household Industry	2,770 (1.68)	5,486 (1.51)	2,776 (1.70)	10,419 (3.55)
4	Other workers	7,860 (4.76)	15,846 (4.37)	6,534 (4.00)	33,975 (11.57)
5	Main workers (1+2+3+4)	59,883 (36.26)	1,18,467 (32.71)	56,475 (34.59)	92,980 (31.65)
6	Marginal workers	8,338 (5.05)	15,057 (4.16)	10,085 (6.18)	4,824 (1.64)
7	Total workers (5+6)	68,221 (41.31)	133524 (36.87)	66,560 (40.78)	97,804 (33.30)
8	Total Non- workers population	96,930 (58.69)	2,28,595 (63.13)	96,676 (59.22)	1,95,940 (66.70)
9	Total population	1,65,151 (100.00)	3,62,119 (100.00)	1,63,236 (100.00)	2,93,744 (100.00)
10	Percentage of total working population to total population	41.31	36.87	40.78	33.30

Note: Figures in brackets denotes percentage to total population

2.4.5 Cropping pattern

The cropping pattern of all the selected blocks of Rewa district was food crop oriented. The food crops occupied more than 85 per cent area of the total cropped area in all the blocks. Except Hanumana block, the rabi crops occupied more than 60 per cent area of the gross cropped area in the remaining three blocks. In Hanumana block, the area under rabi and kharif crops was more or less same. In all the blocks the area under total cereals was more than 60.0 per cent. Wheat was the major cereal crop of Rewa. It occupied more than 36 per cent area of the gross cropped area in all the blocks except Hanumana block, where wheat crop occupied nearly 30 per cent area (Table 2.8).

Table 2.8 Cropping pattern of selected tehsils/ blocks of Rewa (Cereals) District (2003-04)

(In- hectares)

S. No.	Crops and crop groups	Raipur (K) Block	Sirmour Block	Hanumana Block	Rewa (Huzoor) Block
1	**Wheat**	11702 (36.58)	27795 (40..52)	19412 (29.89)	21828 (44.94)
2	Paddy	6791 (21.23)	17443 (25.43)	27345 (42.10)	7273 (14.97)
3	Jowar	370 (1.16)	1458 (2.12)	735 (1.13)	274 (0.56)
4	Maize	-	3 (Neg)	1049 (1.61)	7 (0.01)
5	Other cereals	830 (2.59)	1229 (1.79)	1376 (2.12)	398 (0.82)
6	**Total cereals**	19693 (61.56)	47928 (69.87)	49917 (76.85)	29780 (61.31)
7	Gram	4879 (15.25)	8691 (12.67)	5340 (8.22)	6596 (13.58)
8	Tur (Arhar)	677 (2.12)	1351 (1.97)	1792 (2.79)	978 (2.01)
9	**Urad**	487 (1.52)	2063 (3.01)	1331 (2.05)	1560 (3.21)
10	Other Pulses	2009 (6.28)	2621 (3.82)	1056 (1.62)	2092 (4.31)
11	**Total Pulses**	8052 (25.17)	14726 (21.47)	9519 (14.66)	11226 (23.11)
12	Sugarcane	3 (Neg)	2 (Neg)	3 (Neg)	7 (0.01)
13	**Total Fruits**	113 (0.35)	309 (0.45)	185 (0.28)	271 (0.56)
14	**Total vegetables**	210 (0.66)	392 (0.57)	207 (0.32)	424 (0.87)
15	**Total spices**	34 (0.11)	92 (0.13)	30 (0.05)	102 (0.21)
16	**Total Food Crops**	28105 (87.85)	63449 (92.50)	59861 (92.16)	41810 (86.08)
17	Cotton and Fibres	-	-	-	-
18	Sesamum (Til)	96 (0.30)	255 (0.37)	746 (1.15)	3079 (6.34)
19	Linseed (Alsi)	880 (2.75)	2030 (2.96)	3941 (6.07)	1235 (2.54)
20	Groundnut	-	-	-	-
21	Rapeseed & Mustard	47 (0.15)	306 (0.45)	332 (0.51)	94 (0.19)
22	Soybean	2835 (8.86)	2499 (3.64)	29 (0.04)	2317 (4.77)
23	**Total Oilseeds**	3858 (12.06)	5090 (7.42)	5048 (7.77)	6725 (13.84)
24	Drugs & Narcotics	11 (0.03)	-	-	-
25	Other	16 (0.05)	45 (0.06)	43 (0.07)	27 (0.06)
26	Fodder	-	10 (0.01)	-	11 (0.02)
27	**Total Non Food Crops**	3885 (12.14)	5145 (7.50)	5091 (7.84)	6763 (13.92)
28	**Total Kharif Crops**	12259 (38.32)	26508 (38.64)	32511 (50.01)	16359 (33.68)
29	**Total Rabi Crops**	19731 (61.68)	42086 (61.35)	32441 (49.9)	32214 (66.32)
30	**Total Cropped Area**	31990 (100.00)	68594 (100.00)	64952 (100.00)	48573 (100.00)

2.4.6 Irrigation

The net irrigated area was highest in Rewa tehsil / block (16,048 hectares) followed by Sirmour tehsil / block (14,289 hectares), Raipur (K) (9,448 hectares) and Hanumana (8,056 hectares). In Raipur (K) tehsil / block, tubewell (62.11 per cent) was the main sources of irrigation followed by wells (21.28 per cent) and other sources (14.62 per cent) of the net irrigated area. In Rewa tehsil / block, tubewell was the major source of irrigation covered 64.65 per cent area of the net irrigated area. Canal was the major source of irrigation in Hanumana tehsil / block occupied 63.88 per cent area of the net irrigated area by all sources. In Sirmour tehsil / block, the major sources of irrigation were wells (27.15 per cent), followed by tubewells (26.43 per cent) and canals (18.63 per cent). Other sources covered 27.41 per cent area of the net irrigated area (Table 2.9).

Table 2.9 Source of Irrigation and Irrigated area (selected tehsils and blocks of Rewa (Cereals) District (2003- 04)

(Area in Hectares)

S. No.	Sources of irrigation	Raipur (K) Tehsil and Block		Sirmour Tehsil and Block		Hanumana Tehsil and Block		Rewa (Huzoor) Tehsil and Block	
		No.	Irrigated area	No.	Irrigated area	No.	Irrigated area	No.	Irrigated area
1	Canals	--	--	21	2,661 (18.63)	--	5,146 (63.88)	6	934 (5.82)
2	Tubewells	1,101	5,868 (62.11)	1,014	3,777 (26.43)	43	36 (0.45)	1,504	10,375 (64.65)
3	Wells	2,352	2,011 (21.28)	2,960	3,879 (27.15)	140	718 (8.91)	1,480	1,362 (8.49)
4	Tank	45	188 (1.99)	66	55 (0.38)	11	59 (0.73)	72	242 (1.51)
5	Other Sources		1,381 (14.62)		3,917 (27.41)		2,097 (26.03)		3,135 (19.53)
6	Net irrigated area by all sources	9,448		14,289		8,056		16,048	
7	Gross irrigated area	9,473		14,289		8,056		16,386	
8	Irrigation Intensity	100.26		100.00		100.00		102.11	

Note : Figures in bracket denotes percentage to net irrigated area.

2.5 Profile of the selected tehsils/ blocks of Vidisha District

2.5.1 Location

Four tehsils/blocks namely, Basoda, Nateran, Kurwai and Sironj were selected from Vidisha district. These four tehsils/blocks having maximum area under gram (pulses). Among four tehsils/blocks, Basoda tehsil/block lies between latitude 23°42' to 24° 02' North and longitudes 77°23' to 78°18' East. Nateran tehsil/block lies between latitude 23°40' to 24°05' North and longitudes 77°20' to 78°0' East. The situation of Kurwai and Sironj tehsils/ blocks are also given in table 2.10. The geographical area of Sironj tehsil/ block was 1,233 sq.km. followed by Basoda (1,226 sq.km.), Nateran (1092.6 sq.km.) and Kurwai (839 sq.km.). The average annual rainfall ranged from 648 mm. in Sironj to 1280 mm. in Kurwai.

Table 2.10 Geographical situation of Vidisha (Pulse) district and selected tehsils/ blocks (2004)

S. No.	District/ Tehsil/ Block	Latitudes (N)	Longitudes (E)	Height from Sea level (mtr.)	Geographical area (Sq. Km.)	Average Annual Rainfall (m.m.)
1	Vidisha District	23°20' to 24° 22'N	77°16' to 78°18'E	428.96	7,371	1,073.8
2	Basoda Tehsil / Block	23° 42' to 24° 02'N	77° 23' to 78° 18'E	415.25	1,226	1,182.4
3	Nateran Tehsil / Block	23° 40' to 24° 05'N	77° 20' to 78° 00'E	418.79	1,068	1,092.6
4	Kurwai Tehsil / Block	23° 55' to 24° 20'N	77° 50' to 78° 18'E	394.45	839	1,280.0
5	Sironj Tehsil / Block	23° 58' to 24° 18'N	77° 27' to 77° 56'E	470.43	1,233	648.0

2.5.2 Land use classification

The total geographical area of Sironj tehsil/ block was 125.45 thousand hectares followed by Basoda (122.32 thousand hectare), Nateran (106.90 thousand hectares) and Kurwai (83.14 thousand hectares). The area occupied by Forest was highest (16.58 per cent) in Sironj followed by Nateran (13.41 per cent), Basoda (8.96 per cent) and Kurwai (0.13 per cent). Among four tehsils/ blocks, the gross cropped area was maximum in Basoda (114.55 thousand hectares) followed by Sironj (112.77 thousand hectares), Nateran and Kurwai. The percentage of net sown area to gross cropped area was highest in Kurwai tehsil/ block (85.99 per cent) followed by Basoda (78.20 per cent), Nateran (71.28 per cent) and Sironj (71.19 per cent). The maximum cropping intensity was observed in Nateran tehsil/ block (135.49 per cent) followed by Kurwai (127.44 per cent), Sironj (126.25 per cent) and Basoda (119.75 per cent (Table 2.11).

Table 2.11 Land Use Classification (Selected Tehsils and Blocks of Vidisha (Pulse) District (2003-04)

(Thousand hectares)

S. No.	Particulars	Basoda Tehsil and Block	Nateran Tehsil and Block	Kurwai Tehsil and Block	Sironj Tehsil and Block
1	Total Geographical Area	122.32 (100.00)	106.90 (100.00)	83.14 (100.00)	125.45 (100.00)
2	Forest	10.96 (8.96)	14.34 (13.41)	0.11 (0.13)	20.80 (16.58)
3	Land not available for cultivation	7.66 (6.26)	7.45 (6.97)	7.02 (8.44)	6.86 (5.47)
4	Other un culturable land excluding fallow	3.66 (2.99)	4.78 (4.47)	2.49 (2.99)	3.22 (2.56)
5	Culturable waste land	3.50 (2.86)	2.44 (2.28)	1.48 (1.78)	3.94 (3.14)
6	Fallow land	0.88 (0.72)	1.69 (1.58)	0.54 (0.65)	1.31 (1.04)
7	Net Sown Area	95.66 (78.20)	76.20 (71.28)	71.50 (85.99)	89.32 (71.19)
8	Area sown more than once	18.89	27.05	19.61	23.44
9	Gross Cropped Area	114.55	103.25	91.11	112.77
10	Cropping Intensity (%)	119.75	135.49	127.44	126.25

2.5.3 Population

Among four selected tehsils/ blocks, the maximum population was observed in Basoda tehsil / block (2,42,085), followed by Sironj (1,93,397), Nateran (1,55,241) and Kurwai (1,36,862). The density of population was highest in Basoda tehsil (198 person per sq.km.) followed by Kurwai (165), Sironj (154) and Nateran (145).In all the tehsils, the number of male population was more than the female population. The percentage of male population to total population in all the four tehsils was about 53 per cent. Similarly, the percentage of female population to total population in all the tehsils/ blocks was nearly 46 per cent. All the tehsils/ blocks of Vidisha district was rural dominated. The percentage of scheduled caste population to total population was highest in Kurwai (23.23 per cent) followed by Sironj (20.76 per cent), Basoda (20.45 per cent) and Nateran (19.34 per cent). The decadal growth rate (1991-2001) of population was highest in Basoda tehsil/ block (29.48 per cent) followed by Nateran (25.51 per cent), Sironj (21.07 per cent) and Kurwai (21.04 per cent) (Table 2.12).

Table 2.12 Population of the selected Tehsils/ Blocks of Vidisha (Pulse) District

(Census 2001)

S. No.	Particulars	Basoda Tehsil	Nateran Tehsil	Kurwai Tehsil	Sironj Tehsil
1	Total Population (Number)	2,42,085	1,55,241	1,36,862	1,93,397
2	Density of population (Per sq.km.)	198	145	165	154
3	Male Population (No. in '000)	128.88 (53.07)	82.94 (53.43)	72.84 (53.22)	103.34 (53.43)
4	Female Population (No. in '000)	113.20 (46.61)	72.30 (46.57)	64.02 (46.78)	90.06 (46.57)
5	Rural Population (Number)	1,77,148 (73.18)	1,55,241 (100.00)	1,23,121 (89.96)	1,51,218 (78.19)
6	Urban Population (Number)	64,937 (26.82)	Neg.)	13,741 (10.04)	42,179 (21.81)
7	Schedule Caste Population	49,510 (20.45)	30,017 (19.34)	31,795 (23.23)	40,148 (20.76)
8	Schedule Tribes Population	17,136 (7.08)	5,839 (3.76)	9,130 (6.67)	3,330 (1.72)
9	Population decadal growth rate (per cent) (1991 – 2001)	29.48	25.51	21.04	21.07

Note : Figures in brackets denotes percentage to total population

2.5.4 Working Population

In all the four selected tehsils/ blocks of Vidisha district, the number of non working population was more than the working population. Among the total workers, the number of main workers was more than the marginal workers in all the four tehsils. The percentage of total working population to total population was highest (44.21 per cent) in Basoda tehsil/ block followed by Kurwai (37.57 per cent), Nateran (36.86 per cent) and Sironj (36.24 per cent) (Table 2.13).

2.5.5 Cropping Pattern

The cropping pattern of selected tehsils / blocks of Vidisha district was food crop oriented as this group of crops occupied 88.87 per cent area in Kurwai tehsil, 84.47 per cent area in Basoda tehsil, 79.42 per cent area in Sironj tehsil and 67.97 per cent area in Nateran tehsil. All the four tehsils were rabi crops dominated as these crops occupied more than 62 per cent area of the gross cropped area in all the four tehsils. Among foodgrains, pulses occupied highest area in all the selected tehsils. Among pulses, gram occupied highest area in all the selected tehsils. In all the four tehsils, gram occupied nearly 30 per cent area of the gross cropped area (Table 2.14).

Table 2.13 Classification of working population of selected tehsil / blocks of Vidisha (Pulse) District

S. No.	Particulars	Basoda Tehsil & Block	Nateran Tehsil & Block	Kurwai Tehsil & Block	Sironj Tehsil & Block
1	Cultivators	29,421 (12.15)	22,355 (14.40)	17523 (12.80)	25603 (13.24)
2	Agricultural Labourers	23218 (9.59)	14,385 (9.27)	13,679 (9.99)	14,636 (7.56)
3	Household Industry	1,787 (0.74)	720 (0.46)	1,304 (0.95)	1,634 (0.84)
4	Other workers	25,397 (10.49)	4,518 (2.91)	8,266 (6.04)	11,927 (6.17)
5	Main workers (1+2+3+4)	79,823 (32.97)	41,978 (27.04)	40,772 (29.79)	53,800 (27.82)
6	Marginal workers	27,200 (11.23)	15,242 (9.82)	10,652 (7.78)	16,295 (8.42)
7	Total workers (5+6)	1,07,023 (44.21)	57,220 (36.86)	51,424 (37.57)	70,095 (36.24)
8	Total Non- workers population	1,35,062 (55.79)	98,021 (63.14)	85,438 (62.43)	1,23,302 (63.75)
9	Total population	2,42,085 (100.00)	1,55,241 (100.00)	1,36,862 (100.00)	1,93,397 (100.00)
10	Percentage of total working population to total population	44.21	36.86	37.57	36.24

Note: Figures in brackets denotes percentage to total population

2.5.6 Irrigation

Among different sources of irrigation in all the four selected tehsils/ blocks, tube well was the major source of irrigation. Irrigation by tube well played major role in Kurwai tehsil (76.60 per cent) followed by Nateran tehsil (37.87 per cent), Basoda tehsil (33.09 per cent) and Sironj (32.89 per cent). Other sources of irrigation also played major role. The irrigation intensity was nearly 100 per cent. The percentage of net irrigated area to net sown area was highest in Kurwai tehsil (50.08 per cent) followed by Nateran tehsil (43.32 per cent), Basoda tehsil (40.06 per cent) and Sironj (29.58 per cent) (Table 2.15).

Table 2.14 Cropping pattern of selected tehsils/ blocks of Vidisha (Pulse) district (2003-04)

(In- hectares)

S. No.	Crops and crop groups	Basoda Tehsil and Block	Nateran Tehsil and Block	Kurwai Tehsil and Block	Sironj Tehsil and Block
1	Wheat	33,801 (29.51)	27,456 (26.59)	24,022 (26.36)	28,741 (25.49)
2	Paddy	178 (0.15)	14 (0.01)	232 (0.25)	01 --
3	Jowar	518 (0.45)	2,100 (2.03)	533 (0.58)	3,472 (3.08)
4	Maize	436 (0.38)	914 (0.88)	458 (0.50)	1,448 (1.28)
5	Other cereals	197 (0.17)	124 (0.12)	176 (0.19)	28 (0.02)
6	**Total cereals**	35,130 (30.67)	30,608 (29.64)	25,421 (27.90)	33,690 (29.88)
7	Gram	36,387 (31.76)	30,353 (29.40)	32,413 (35.57)	37,819 (33.54)
8	Tur (Arhar)	193 (0.17)	141 (0.14)	30 (0.03)	203 (0.18)
9	Urad	3,681 (3.21)	1,933 (1.87)	10,413 (11.43)	6,879 (6.10)
10	Other Pulses	21,013 (18.34)	6,804 (6.59)	12,475 (13.69)	8,944 (7.39)
11	**Total Pulses**	61,274 (53.49)	39,231 (37.99)	55,331 (60.73)	53,845 (47.75)
12	Sugarcane	02 --	103 (0.10)	--	46 (0.04)
13	**Total Fruits**	45 (0.04)	24 (0.02)	26 (0.03)	60 (0.05)
14	**Total vegetables**	287 (0.25)	165 (0.16)	175 (0.19)	241 (0.21)
15	**Total spices**	21 (0.02)	52 (0.05)	19 (0.02)	1681 (1.49)
16	**Total Food Crops**	96,759 (84.47)	70,183 (67.97)	80,972 (88.87)	89,563 (79.42)
17	Cotton and Fibres	06 --	16 (0.01)	01 --	07 --
18	Sesamum (Til)	10 (0.009)	70 (0.07)	10 (0.01)	45 (0.04)
19	Linseed (Alsi)	116 (0.10)	15 (0.01)	7 --	50 (0.04)
20	Groundnut	48 (0.04)	446 (0.43)	154 (0.17)	436 (0.39)
21	Rapeseed & Mustard	139 (0.12)	03 --	111 (0.12)	152 (0.13)
22	Soybean	16,281 (14.21)	30,376 (29.42)	9,241 (10.14)	1,9876 (17.63)
23	Other oilseeds	01 --	--	04	17 (0.01)
24	**Total Oilseeds**	16,595 (14.49)	30,910 (29.94)	9527 (10.46)	20,576 (18.25)
25	Drugs & Narcotics	04 --	--	02 --	07 --
26	Fodder	1,186 (1.04)	2,146 (2.08)	610 (0.67)	2,613 (2.32)
27	**Total Non Food Crops**	17,792 (15.53)	33,071 (32.03)	10,140 (11.13)	23,203 (20.58)
28	**Total Kharif Crops**	22,733 (19.85)	38,445 (37.23)	21,937 (24.08)	35,490 (31.47)
29	**Total Rabi Crops**	91,818 (80.15)	64,810 (62.77)	69,175 (75.92)	77,276 (68.53)
30	**Total Cropped Area**	1,14,551 (100.00)	1,03,255 (100.00)	91,112 (100.00)	1,12,766 (100.00)

Table 2.15 Source of Irrigation and Irrigated area (selected tehsils and blocks of Vidisha (Pulse) District (2003- 04)

(Area in Hectares)

S. No.	Sources of irrigation	Basoda Tehsil and block		Nateran Tehsil and Block		Kurwai Tehsil and Block		Sironj Tehsil and Block	
		No.	Irrigated area	No.	Irrigated area	No.	Irrigated area	No.	Irrigated area
1	Canals	1	1370 (3.57)	1	497 (1.51)	Neg.	--	4	5233 (19.81)
2	Tubewells	1408	12681 (33.09)	809	12503 (37.87)	1961	27430 (76.60)	1088	8690 (32.89)
3	Wells	2298	6673 (17.41)	2912	7569 (22.93)	831	3712 (10.37)	1331	1956 (7.40)
4	Tank	6	1668 (4.35)	3	328 (0.99)	5	329 (0.92)	3	333 (1.26)
5	Other Sources	--	15,926 (41.56)		12,118 (36.70)		4337 (12.11)		10210 (38.64)
6	Net irrigated area by all sources		38318		33015		35808		26422
7	Gross irrigated area		38318		33015		33015		26422
8	Percentage of net irrigated area to net sown area.		40.06		43..32		50.08		29.58

Note : Figures in bracket denotes percentage to net irrigated area

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CHAPTER – III
METHODOLOGY

This chapter included sampling design, selection of districts, tehsils/ blocks and villages, selection of farmers, methods of data collection, reference period, method of analysis and tools used for analysis of data.

3.1 Sampling Design

The methodology adopted for the study consisted of a stratified multistage sampling for the selection of study regions and the sampling units. A three stage stratified random sampling design was used to select the block, village and farmers. For this centre, Madhya Pradesh state was selected purposively. Out of 48 districts of the State, Rewa district was selected for cereals as the area under cereal crops was highest in this district. Similarly for pulses, Vidisha district was selected as the area under pulses was highest in Vidisha district.

From Rewa district, one cereal crop (wheat) was selected for the study as this crop occupied highest area in cereal group. Similarly from Vidisha district, one pulse crop (Gram) was selected as it occupied largest area in pulse group.

From each selected districts, four tehsils/ blocks were selected on the basis of highest area under respective crops. From each selected block, a list of all the villages was prepared and five villages were selected from each block in consultation with the Deputy Director of Agriculture and SDO of Agriculture of the concerned district. Further, from each of the selected village, a list of farmers was prepared. The farmers were grouped into three size groups viz., small (0-2 hects.), medium (2.01 – 4.00 hects.) and large (above 4 hects.). Then, a sample of 15 farmers (5 small, 5 medium and 5 large farmers) from each village was randomly selected from the referred list by adjusting the available size classes. In this way, a sample of 75 farmers from 5 villages were selected and a total of 300 farmers from 20 villages of 4 tehsils/ blocks were selected.

In this way, a total of 600 farmers, comprising 300 farmers (for cereal- wheat) from Rewa district and 300 farmers (for pulses- gram) from Vidisha district were selected.

The name of selected tehsils/blocks, selected villages and number of selected farmers from cereal district (Rewa) and pulse district (Vidisha) are listed in table 3.1 and table 3.2 respectively.

Table 3.1 Stratum wise list of selected name of villages and total number of farmers for wheat (cereal) – District Rewa

Stratum Tehsils	Name of Taluka/ Blocks	Name of the selected villages	Total number of farmers in the village	Total No. of farmers selected		
				Small	Medium	Large
1. Raipur Karchuliyan	Raipur Karchuliyan	1 Etaura	139	5	5	5
		2 Mahsua	139	5	5	5
		3 Navagaon	126	5	5	5
		4 Sonaura	198	5	5	5
		5 Varrehi	462	5	5	5
2. Hanumana	Hanumana	1 Alva Khurd	120	5	5	5
		2 Majhigawa	182	5	5	5
		3 Masuriha	114	5	5	5
		4 Noun kala	536	5	5	5
		5 Salaiya	265	5	5	5
3. Sirmour	Sirmour	1 Delahi	458	5	5	5
		2 Gaura	194	5	5	5
		3 Kanji	139	5	5	5
		4 Karaudaha	114	5	5	5
		5 Nakta	85	5	5	5
4. Rewa	Hazoor	1 Azgarha	202	5	5	5
		2 Khadda	107	5	5	5
		3 Khaur	108	5	5	5
		4 Kothi	217	5	5	5
		5 Vasi	325	5	5	5
ALL			**4230**	**100**	**100**	**100**

Table 3.2 Stratum wise list of selected name of villages and total number of farmers for gram (pulse crop) - District Vidisha.

Stratum Tehsils	Name of Taluka/ Blocks	Name of the selected villages	Total number of farmers in the village	Total No. of farmers selected		
				Small	Medium	Large
1. Basoda	Basoda	1 Biladana	194	5	5	5
		2 Gamakar	193	5	5	5
		3 Mudara	103	5	5	5
		4 Pachama	86	5	5	5
		5 Rojaru	219	5	5	5
2. Kurwai	Kurwai	1 Berkhedi	102	5	5	5
		2 Chopra	155	5	5	5
		3 Maliyakheda	100	5	5	5
		4 Parochha	235	5	5	5
		5 Roshan Piparia	288	5	5	5
3. Nateran	Nateran	1 Bamori	135	5	5	5
		2 Hingoli	132	5	5	5
		3 Jatpura	159	5	5	5
		4 Mahoota	199	5	5	5
		5 Pali	242	5	5	5
4. Sironj	Sironj	1 Khejra gopal	89	5	5	5
		2 Kakarkhedi khurd	100	5	5	5
		3 Manjoor khedi	93	5	5	5
		4 Sabdalpur	110	5	5	5
		5 Siyalpur	73	5	5	5
ALL			**3007**	**100**	**100**	**100**

Data on household members, land inventory, crop inventory, animal inventory, area and production of foodgrains (cereals and pulses) were collected from each selected farmers. Information of seed, feed for bovines (cattles + buffaloes + poultry) and wastage (by various ways) of foodgrain production were collected from all the selected farmers by using a well designed pre-tested questionnaire by personal interview method.

3.2 Reference Period

The reference year for the study was agricultural year 2004-05 viz. crop season rabi 2004 and kharif 2005. The field work was started after the harvest of crops.

3.3 Data Collection

Both primary and secondary data were collected. Primary data was collected from the sample farmers and secondary data was collected from Agricultural Statistics, at a glance, Economic Survey, Annual Reports of various Ministries/ Departments of the Govt. of Madhya Pradesh, Bhopal and Govt. of India. The data published in reputed English newspapers/ magazines and reports have also been used in the study.

3.4 Tools used for analysis for data

Simple averages and percentages were used for the estimation of seed (used and kept for next year), feed (feed fed to bovines and poultry) and wastage ratios for foodgrain production at different stages.

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CHAPTER – IV

RESULTS AND DISCUSSION

This chapter is based on the findings of the filed investigation carried out for sample farms. As mentioned earlier schedules specifically developed for this study were canvassed and information on seed, feed and wastage for cereal crop (wheat) and pulse crop (gram) collected and tabulated. For this study two districts, namely Rewa for wheat crop and Vidisha for gram were selected. In Madhya Pradesh, the area under cereals was highest in Rewa district and the area under pulses was highest in Vidisha district. As decided by the coordinating centre, two crops (one cereal and one pulse) were choosen. In Rewa district, the density of wheat was maximum, and, similarly in Vidisha district, the area of gram was highest. In this way two crops namely, wheat and gram were selected from Rewa and Vidisha district respectively. From each district, four blocks were selected and from each block five villages were selected and from each village 15 farmers (5 small, 5 medium and 5 large) were selected. Thus, the total sample comprised 600 farmers (300 farmers from Rewa district for wheat and 300 farmers from Vidisha district for gram. It was thought fit to present the results of field investigation individually for each of the selected crops.

Villages Selected :

From Rewa district, 20 villages and from Vidisha district, 20 villages were selected. The list of selected villages from both the districts are given below.

District	Tehsils/ blocks	Name of villages
1. Rewa District Cereal (Wheat)	1. Raipur Karchulian	Etaura, Mahsua, Navagaon, Sonaura, Varrehi
	2. Hanumana	Alva khurd, Majhigawa, Masuriha, Nounkala, Salaiya
	3. Sirmour	Delahi, Gaura, Kanji, Karaudaha, Nakta,
	4. Rewa (Huzoor)	Azgarha, Khadda, Khaur, Kothi, Vasi
2. Vidisha District Pulses (Gram)	1. Basoda	Biladana, Gamakar, Mudara, Pachama, Rojaru
	2. Kurwai	Berkhedi, Chopra, Maliya Kheda, Parochha, Roshan Pipariya
	3. Nateran	Bamori, Hingoli, Jatpura, Mahoota, Pali
	4. Sironj	Khejra gopal, Kakarkhedi khurd, Manjoor Khedi, Sabdalpur, Siyalpur.

4.1 Cereal crop (Wheat), Rewa District

4.1.1 Population, castes and size of holding of selected households

From Rewa district, 300 households (100 small, 100 medium and 100 large farmers) were selected for this study. These 300 households comprised of 2188 population. Among total number of households, 124 belonged to "OBC" group, 122, "Other" group and remaining 54 belonged to "Scheduled Caste" group. In small size group, maximum number of households (52) belonged to "OBC" group followed by "other" group (29) and "Scheduled Caste" (19). In medium size group, similar trend was observed. But in large size group, highest number (59) of farmers belonged to "Other" group followed by "OBC" group (29) and "Schedule Caste" group (12). None of the sample farmers belonged to "Scheduled Tribes" group (Table 4.1.1).

Table 4.1.1 Size class wise and caste wise distribution of population of selected households District Rewa

Size Groups	Caste							
	SC		OBC		Others		All	
	No	Population	No	Population	No	Population	No	Population
Small	19	114 (16.69)	52	344 (50.37)	29	225 (32.94)	100	683 (100)
Medium	23	164 (21.06)	43	353 (45.31)	34	262 (33.63)	100	779 (100)
Large	12	75 (10.33)	29	247 (34.02)	59	404 (55.65)	100	726 (100)
All	54	353 (16.13)	124	944 (43.14)	122	891 (40.73)	300	2,188 (100)

4.1.2 Size class wise distribution of farmers and average size of holding

The total number of farmers in the selected villages of Rewa district was 4,230. Of this, the highest number (3,066) of farmers belonged to small size group followed by medium size group (747 farmers) and large size group (417 farmers). The average size of holding of the district was 3.20 hectares. In small group, the average size of holding was 0.76 hectare, followed by medium group (2.61 hectares) and large groups (6.24 hectares). None of the farmers adopted the practice of leased in/ leased out of land. The overall net cropped area

(per household) of the district was 3.37 hectare and gross cropped area (per household) was 6.24 hectares. The overall cropping intensity of the district was 185.16 per cent. The cropping intensity of small group was 191 per cent followed by medium group (182.45 per cent) and large group (185.71 per cent). Of the total number of farmers in the selected villages (4230), 300 farmers (100 from each group i.e. small, medium and large) were selected. The overall average size of holding of the selected farms was 3.45 hectares. In the case of small group, the average size of holding was 1.01 hectare followed by medium farms (3.06 hectares) and large farms (6.28 hectares) (Table 4.1.2).

Table 4.1.2 Size class wise Distribution of Number of Farmers and Average Size of Holding for the wheat (cereal crop), Rewa District

Size of holding Specify)	No. of farmers in the Village	Average size of holding	Leased in/ out area as % of Total Area	Net cropped area (Average)	Gross Cropped area (Average) per HH	No. of Sample farmers selected	Average Size of Holding Selected Sample farmers (Ha)
	(Nos)	(Ha)	(%)	Per HH	(Ha)	(Nos)	(Ha)
Small	3,066	0.76	0	0.99	1.89	100	1.01
Medium	747	2.61	0	3.02	5.51	100	3.06
Large	417	6.24	0	6.09	11.31	100	6.28
All	**4,230**	**3.20**	**0**	**3.37**	**6.24**	300	**3.45**

4.1.3 Distribution of agricultural land

The total area under wheat crop in Rewa district was 599.99 hectares. Of which 360.58 ha (about 60.00 per cent) area was irrigated and remaining 239.41 ha (40.00 per cent) was unirrigated. The total area under wheat in small, medium and large groups were 78.56 ha., 175.46 ha. and 345.97 ha. respectively. In the case of small group, 64.56 per cent area was irrigated and 35.44 per cent was unirrigated. In medium group, of the total area under wheat, 52.84 per cent was under irrigation and remaining 47.16 per cent was unirrigated. Similar trend was also observed in large group, where, 62.72 per cent area was irrigated and 37.28 per cent area was unirrigated. In all the size groups, the percentage of area under irrigated wheat was more than the unirrigated wheat (Table 4.1.3).

Table 4.1.3 Size class wise Distribution of Agricultural land for Wheat, Rewa District

Size of holding	(Area - Hectares)		
	Irrigated	Un irrigated	Total
Small	50.75 (64.56)	27.81 (35.44)	78.56 (100.00)
Medium	92.83 (52.84)	82.63 (47.16)	175.46 (100.00)
Large	217.00 (62.72)	128.97 (37.28)	345.97 (100.00)
All	360.58 (60.00)	239.41 (40.00)	599.99 (100.00)

Note : Figures in brackets denotes percentage to total

4.1.4 Cropping pattern

The main crops grown by the sample farmers of Rewa District were paddy, soybean, urad and arhar in kharif and wheat, gram, masoor, barley and linseed in rabi season. The area under these crops are given in table 4.1.4. The area under wheat was highest in all the size groups. The overall gross cropped area of the sample farms was 1867.89 ha. Of this, 32.10 per cent area (599.99 ha.) was under wheat followed by paddy (26.49 per cent), gram (11.24 per cent), soybean (10.60 per cent), masoor (7.54 per cent), urad (6.58 per cent), arhar (2.25 per cent), barley (1.28 per cent) and linseed (0.96 per cent). In small group, kharif crops occupied 46.23 per cent area and rabi crops occupied 53.77 per cent area of the gross cropped area. Similarly, in medium group, the area occupied by kharif crops was 45.02 per cent and rabi crops was 54.98 per cent. In large group, 46.08 per cent area was under kharif crop and remaining 53.92 per cent area was under rabi crops. The cropping pattern of Rewa district was rabi crops dominated and wheat was the major crop of this district which occupied highest area in cropping pattern (Table 4.1.4.).

Table 4.1.4 Cropping pattern of the sample farmers of Rewa District

Size of holding	Area share and the crop (proportion to GCA) per cent										
	Crops										
	Paddy	Soybean	Urad	Arhar	Wheat	gram	Masoor	Vegetables	Barley	Linseed	GCA (In ha.)
Small	65.51 (35.48)	4.12 (2.15)	15.49 (8.06)	1.30 (0.54)	78.56 (42.48)	9.35 (4.84)	6.26 (3.23)	3.00 (1.61)	1.13 (0.54)	1.18 (1.07)	185.90 (100.00)
Medium	139.90 (25.42)	62.69 (11.25)	35.06 (6.35)	11.15 (2.00)	175.46 (31.94)	63.03 (11.43)	36.10 (6.53)	6.61 (1.27)	10.73 (1.81)	10.33 (2.00)	551.06 (100.00)
Large	291.53 (25.74)	131.23 (11.67)	70.26 (6.19)	28.33 (2.48)	345.97 (30.59)	135.09 (12.02)	99.27 (8.75)	9.65 (0.88)	12.92 (1.15)	6.68 (0.53)	1130.93 (100.00)
All	496.94 (26.49)	198.04 (10.60)	120.81 (6.58)	40.78 (2.25)	599.99 (32.10)	207.47 (11.24)	141.63 (7.54)	19.26 (0.96)	24.78 (1.28)	18.19 (0.96)	1867.89 (100.00)

Note : Figures in brackets denotes percentage to Gross Cropped Area

4.1.5 Production and productivity of selected crops

The major cereals grown by the sample farmers of Rewa district were wheat, paddy and Barley. The overall productions of these three cereals were 15195.50 qtls., 16361.00 qtls. and 231.00 qtl. respectively. The production per hectare (productivity) of these cereals were 25.33 qtl., 32.65 qtl. and 9.59 qtl. respectively. In small group, the gross value of production of selected crops at farm harvest prices prevailing in the region, was Rs. 30,81,048. In medium group, the total gross value of production was Rs.1,20,38,699.

In large size group, the gross value of production of selected crops was Rs.1,84,89,213. The overall total gross value of production at farm harvest prices was Rs.3,36,08,960 (Table 4.1.5).

Table 4.1.5 Production and Productivity of selected crops of sample farm, Rewa District

(Production in Quintals)

Size of holding	Paddy	Soybean	Urad	Arhar	Wheat	Gram	Masoor	Barley	Linseed	Vege-table	Total Gross value of Production at Farm harvest prices (Rs.)
Small	2,112.00	49.44	139.41	9.10	1866.50	102.85	50.08	10.00	2.43	360.00	30,81,048
	(32.00)	(12.00)	(9.15)	(7.25)	(23.76)	(12.00)	(8.30)	(10.20)	(2.06)	(120.0)	
Medium	4,579.00	752.28	315.54	78.05	4393.00	693.33	288.80	94.00	20.14	793.20	1,20,38,699
	(32.71)	(11.50)	(9.00)	(7.00)	(25.04)	(11.75)	(8.15)	(9.40)	(1.95)	(120.0)	
Large	9,670.00	1574.76	632.34	198.31	8936.00	1485.99	794.16	127.00	12.69	1109.75	1,84,89,213
	(33.23)	(11.30)	(8.90)	(6.95)	(25.83)	(11.00)	(7.90)	(9.77)	(1.90)	(115.0)	
All	16,361.00	2,376.48	1,087.29	285.46	15,195.50	22,82.17	1,133.04	231.00	36.38	2,272.68	3,36,08,960
	(32.65)	(11.50)	(9.00)	(7.10)	(25.33)	(11.40)	(8.15)	(9.59)	(2.00)	(118.0)	
FHP	520	1200	1500	1300	725	1500	1550	590	1450	300	

FHP= Farm Harvest Prices (Rs. per quintal)
Figures in brackets are productivity (Quintal per hectare)

4.1.6 Seed Requirement

In small size group the total area under wheat for the selected farmers was 78.56 hectares and total production was 1,86,650 kg. For the production of wheat, small farmers used 9,589 kg. of seed from previous year's production and kept 10,050 kg. of seed from current year's production. The percentage quantity of seed used with current year's total production was 5.14 and kept 5.38 per cent seed from current year's production for the next year.

In medium group, the area under wheat was 175.46 hectares and production was 4,39,300 kg. The farmers of this group used 21,704 kg. of seed which was 4.94 per cent of the current year's production of wheat. They kept 6.30 per cent seed for next year's production.

The large size farmers covered 345.97 hectare of land under wheat crop and produced 8,93,600 kg. of wheat. For the production of wheat crop, the quantity of seed used by farmers was 44,075 kg., i.e. 4.93 per cent of the current year's production and kept 5.63 per cent grains as seed for the next year. In all size groups, the quantity of seed kept for next year's production was more than the quantity of seed used for the current year's production (Table 4.1.6).

Table 4.1.6 Seed requirement for Wheat (Cereal), Rewa District

Size of Holding	Area (ha.)	Production (kg.)	Quantity of Seed (kg.)		Percentage quantity of Seed with production	
			Used	Kept	Used	Kept
Small	78.56	1,86,650	9,589	10,050	5.14	5.38
Medium	175.46	4,39,300	21,704	27,700	4.94	6.30
Large	345.97	8,93,600	44,075	50,300	4.93	5.63
All	599.99	15,19,550	75,368	88,050	4.96	5.79

Note : Seed used means seed from previous year's production
Seed kept means seed kept from current year's production

4.1.7 Production and disposal of wheat

In small size group, the total production of wheat was 1866.50 Qtls. Of this 39.60 per cent quantity of wheat was used for home consumption purpose and 5.39 per cent grains was kept for seed purpose for the next year's production. The produce used as

animal and poultry feed was 5.18 per cent and 0.46 per cent respectively. The marketed surplus of wheat in small group was 35.69 per cent and marketable surplus was 46.46 per cent of the total quantity of wheat produced.

In medium size group, the selected farmers produced 4,393 qtl. wheat. The farmers of this group kept 19.09 per cent grains for home consumption and kept 6.27 per cent grains as a seed for the next year's production. Nearly 4.59 per cent and 0.56 per cent of wheat production was kept for animal and poultry feed respectively. About 4.23 per cent of the produce was given to labour as kind wages. The marketed surplus of wheat was estimated to be 51.88 per cent.

The total production of wheat in large size group was 8936.00 qtls. The farmers of this group kept 5.61 per cent grains as seed for next year's production and 9.72 per cent produce for home consumption. Of the total production of wheat, 2.52 per cent grains was used by animal as feed and 0.12 per cent grains was used by poultry as a feed. The marketed surplus of wheat in this group was 64.96 per cent of the total produce.

The overall picture of production and disposal of wheat showed that 16.11 per cent grains was used as home consumption and 5.80 per cent grains kept for next year's production. The grains used as animal feed was 3.43 per cent and poultry feed was 0.28 per cent of the total production. The marketed surplus of wheat was 57.64 per cent.

It was observed that the quantity of marketed surplus increases as the size of farms increased. It was lowest in small group and highest in large group. Similar trend was observed in the case of wages given to labour. In the case of home consumption, the picture was opposite. The quantity of produce kept for home consumption was maximum in small group and lowest in large size group (Table 4.1.7).

4.1.8 Consumption as feed (wheat) by livestock

The total number of livestock on sample farms was 1759 in Rewa district. It consisted of 712 milch animal and 1047 dry animals. In the case of milch animal, there were 379 cows and 333 buffaloes, and in the case of dry animal there were 116 cows, 73 buffaloes, 367 bullocks, 394 calves and 97 other animals. A total quantity of 18,200 kg. of wheat

Table 4.1.7 Production and Disposal of Wheat in different size of holdings, Rewa District

(Quantity in quintal)

Size of Holding	Total Production (quintals)	Previous year's Seed used	Kept for seed for next time	Exchange as seed	Sold for seed	Home Consumption	Kind wages to labour	Used as Animal feed	Used as Poultry feed.	Marketable surplus	Marketed surplus
Small	1,866.50 (100.00)	95.89 (5.13)	100.50 (5.39)	0 0	0 0	739.00 (39.60)	54.50 (2.90)	96.50 (5.18)	9.00 (0.46)	867.00 (46.46)	666.00 (35.69)
Medium	4,393.00 (100.00)	217.04 (4.91)	277.00 (6.27)	0 0	0 0	841.00 (19.09)	187.00 (4.23)	202.00 (4.59)	24.00 (0.56)	2,862.00 (64.94)	2,285.50 (51.88)
Large	8,936.00 (100.00)	440.75 (4.92)	503.00 (5.61)	0 0	0 0	869.00 (9.72)	390.00 (4.37)	225.00 (2.52)	11.00 (0.12)	6,938.00 (77.62)	5,806.00 (64.96)
All	15,195.50 (100.00)	753.68 (4.93)	880.50 (5.80)	0 0	0 0	2,449.00 (16.11)	631.50 (4.14)	523.50 (3.43)	44.00 (0.28)	10,667.00 (70.19)	8,757.50 (57.64)

Note : Figures in brackets denote percentage to total production.

grains was consumed by 495 cows as feed. The consumption of wheat grain per cow was 36.77 kg. Similarly, 406 buffaloes consumed a total quantity of 24,425 kg. wheat grains as feed. The consumption of wheat grains per buffaloe was 60.16 kg. A total of 367 bullocks consumed 9,725 kg. of wheat as feed and per bullock consumption was 26.50 kg.

The overall picture showed that a total quantity of 52,350 kg. of wheat grains was consumed by 1759 animals and the consumption per animal came to 29.76 kg. (Table 4.1.8).

Table 4.1.8 Wheat (Cereal) consumed as feed by live stock in Rewa District

S. No.	Name of Animal	In Milk		Dry		Total consumption (Kg.)	Consumption of Crop/ Animal (Kg.)
		No.	Qty. (kg.)	No.	Qty. (kg.)		
1	Cow	379	17,850	116	350	18,200	36.77
2	Buffaloe	333	24,425	73	0	24,425	60.16
3	Bullock	0	0	367	9,725	9,725	26.50
4	Calves	0	0	394	0	0	0
5	Other	0	0	97	0	0	0
Total		712	42,275	1,047	10,075	52,350	29.76

4.1.9 Consumption as feed (wheat) by poultry birds

The total number of poultry birds kept by sample farmers of Rewa district was 735. In small size group, 103 poultry birds consumed 900 kg. of wheat grains as feed. In medium group, 390 birds consumed 2,400 kg. of wheat grains and in large group, 242 poultry birds consumed 1,100 kg. of wheat grains as feed. The consumption of grains per bird in small, medium and large size groups came to 8,738 gms, 6,154 gms and 4,545 gms respectively. The overall picture showed that the consumption of wheat grains per bird came to 5,986 gms (Table 4.1.9).

Table 4.1.9 Consumption of (Wheat) cereal as feed by Poultry Birds

S. No.	Size of Farms	Number of Birds	Feed (Kg.)	Consumption per bird (gram)
1	Small	103	900	8,738
2	Medium	390	2,400	6,154
3	Large	242	1,100	4,545
4	All	735	4,400	5,986

4.1.10 Wastage of Wheat at harvest and post harvest stages.

The total production of wheat in small size group was 1,86,650 kg. Nearly 2.29 per cent loss of grain was observed during harvesting of crop. Wastage of grains due to rats, dampness and insect pest was 3.12 per cent of the total produce. During home consumption, the loss was 0.85 per cent. Nearly 0.36 per cent feed left as unconsumed by animals and poultry during feeding. The total loss was observed in small group was 8.17 per cent. Mostly the ratio of losses during harvesting, threshing, grain left in straw and transportation are similar in all the size groups. The losses during storage was highest in small groups (3.12 per cent) and lowest in large size group (1.60 per cent). In medium group the losses during storage was 2.28 per cent. Similar trend in losses of grains was observed during home consumption and animal and poultry feed. The total wastage of wheat grains in small, medium and large groups came to 8.17 per cent, 6.84 per cent and 5.88 per cent respectively. The losses was highest in small group and lowest in large group (Table 4.1.10).

Table 4.1.10 Wastage of Wheat (cereal) at different harvest and post harvest stages

Size of holding	Total production (Kg.)	Wastage (kg.)							
		Harvesting	Threshing and Shattered	Straw	Transportation	Storage	Home Consumption	Left for Animal/ Poultry Feed	Total wastage %
Small	1,86,650	4,285.00 (2.29)	1,878.00 (1.01)	381.70 (0.20)	631.50 (0.34)	5,817.00 (3.12)	1,585.00 (0.85)	668.00 (0.36)	8.17
Medium	4,39,300	9,940.00 (2.26)	4,455.00 (1.01)	909.00 (0.21)	1,539.00 (0.35)	10,033.00 (2.28)	1,947.00 0.44	1,293.00 (0.29)	6.84
Large	8,93,600	20,342.00 (2.28)	9,061.00 (1.01)	1,857.00 (0.21)	3,223.00 (0.36)	14,305.00 (1.60)	2,302.00 (0.26)	1,423.00 (0.16)	5.88
All	15,19,550	34,567.00 (2.27)	15,394.00 (1.01)	3,147.70 (0.20)	5,393.50 (0.35)	30,155.00 (1.98)	5,834.00 (0.38)	3,384.00 (0.22)	6.41

Note : Figures in brackets denote percentage to total production

4.1.11 Percentage of Seed, feed and wastage in production of wheat

The total area under wheat in small size group was 78.56 hectares with a total production of 1,86,650 kg. For the production of so much quantity of wheat, 9,589 kg. of seed (5.14 per cent) was used. A total of 10,550 kg. of produce (5.65 per cent) was used as animal and poultry feed and the wastage during harvest and post harvest stages was 15,245 kg. (8.17 per cent) of the total production of Wheat. The consumption of total production of wheat as seed, feed and wastages was 35,384 kg. (18.96 per cent).

In medium size group, the percentage of seed, feed and wastage in total production of wheat was 4.94, 5.14 and 6.86 respectively.

In large size group, the percentage of seed, feed and wastage in total production was 4.93, 2.64 and 5.88 respectively.

The consumption of seed, feed and wastage came to 18.96 per cent in small group, 16.94 per cent in medium group and 13.45 per cent in large group. The overall consumption of seed, feed and wastage was 15.13 per cent. The figures for consumption of wheat grains as seed, feed and wastage decreases as the size of holdings increases (Table 4.1.11).

Table 4.1.11 Percentage of seed, feed and wastage in production of cereals (wheat), Rewa District.

Size of Holding	Area (ha.)	Total Production (Kg.)	Seed used		Seed kept		Used as feed		Wastage		Consumption as seed, feed and wastage	
			Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)
Small	78.56	1,86,650	9,589	5.14	10,050	5.38	10,550	5.65	15,245	8.17	35,384	18.96
Medium	175.46	4,39,300	21,704	4.94	27,700	6.30	22,600	5.14	30,116	6.86	74,420	16.94
Large	345.97	8,93,600	44,075	4.93	50,300	5.63	23,600	2.64	52,513	5.88	1,20,188	13.45
All	599.99	15,19,550	75,368	4.96	88,050	5.79	56,750	3.73	97,875	6.44	2,29,993	15.13

4.2 Pulse Crop (Gram), Vidisha District

4.2.1 Population, Castes and Size of Holding

The selected 300 households of Vidisha comprised of 1,932 populations. Among total number of population, 71.22 per cent population belonged to "other" group, whereas, 21.59 per cent population belonged to "OBC" group and 7.19 per cent belonged to

"Scheduled Caste" group. In all the three size groups, the maximum number of farmers belonged to "other" group. In small size group, 20 households belonged to "Scheduled Castes" group and 18 households belonged to "OBC" group. In medium size group 2 household belonged to Scheduled Caste" group, 24 belonged to "OBC" group and 74 belonged to "Other" group. Similar trend was also observed in large size group. Of the total population (1932), the highest number of population (702) belonged to large size group followed by medium size group (683) and small size group (547). In sample households, none of the households belonged to "Scheduled tribe" group (Table 4.2.1)

Table 4.2.1 Size class wise and caste wise distribution of population of selected households District Vidisha

Size Groups	**Caste**							
	SC		OBC		Others		All	
	No	Population	No	Population	No	Population	No	Population
Small	20	101 (18.46)	18	86 (15.73)	62	360 (65.81)	100	547 (100)
Medium	02	14 (2.05)	24	174 (25.48)	74	495 (72.47)	100	683 (100)
Large	03	24 (3.42)	24	157 (22.36)	73	521 (74.22)	100	702 (100)
All	25	139 (7.19)	66	417 (21.59)	209	1376 (71.22)	300	1932 (100)

4.2.2 Size Class wise distribution of farmers

The total number of farmers in 20 selected villages of Vidisha district was 3007. The number of farmers decreases with the increase in the size of farms. The number of farmers in small size group was highest (1875) followed by 620 farmers in medium size group and 512 belonged to large size group. The average size of holding of the district was 3.47 hectares. It was 1.01 hectare in small size group followed by 2.88 hectares in medium size group and 6.52 ha. in large size group. The system of leased in/ leased out area was uncommon on selected farms. The overall net cropped area of Vidisha district was 3.97 hectares and gross cropped area was 6.42 hectares. The overall cropping intensity of the district was 161.71 per cent. The cropping intensity of small size group was 154.05 per cent followed by 170.64 per cent in medium size group and 159.43 per cent in large size group. A total number of 300 farmers (100 farmers from each size group) were selected. The overall average size of holding of selected household was 3.79 hectares. The average size of holding of selected

small farmers was 0.99 hectare followed by medium farmers, 2.95 hectares and large farmers, 7.42 hectares (Table 4.2.2).

Table 4.2.2 Size class wise Distribution of Number of Farmers and Average Size of Holding for the (gram) Pulse, District- Vidisha

Size of holding	No. of farmers in the Village	Average size of holding	Leased in/ out area as % of Total Area	Net cropped area (Average)	Gross Cropped area (Average) per HH	No. of Sample farmers selected	Average Size of Holding Selected Sample farmers (Ha)
	(Nos)	(Ha)	(%)	Per HH	(Ha)	(Nos)	(Ha)
Small	1875	1.01	--	1.11	1.71	100	0.99
Medium	620	2.88	--	3.1	5.29	100	2.95
Large	512	6.52	--	7.69	12.26	100	7.42
All	3007	3.47	--	3.97	6.42	300	3.79

4.2.3 Distribution of agricultural land

The total area under gram was 514.58 hectares. Of which 61.05 per cent area was irrigated and remaining 38.95 per cent was unirrigated. The total area of gram was 62.69 hectares in small size group. Of this area, 39.68 per cent area was irrigated and 60.32 per cent area was unirrigated. The similar trend was observed in medium group. But in the case of large group, the trend was different. In this group, 73.68 per cent area of gram was irrigated, whereas, 26.32 per cent was unirrigated (Table 4.2.3).

Table 4.2.3 Size class wise Distribution of Agricultural land for Gram

Size of holding	**(Area - Hectares)**		
	Irrigated	Un irrigated	Total
Small	24.75 (39.68)	37.94 (60.32)	62.69 (100.00)
Medium	64.96 (44.22)	82.24 (55.78)	147.20 (100.00)
Large	224.29 (73.68)	80.40 (26.32)	304.69 (100.00)
All	314.00 (61.05)	200.58 (38.95)	514.58 (100.00)

Note : Figures in brackets denote percentage to total

4.2.4 Cropping Pattern

The major crops grown by sample farmers in Vidisha district were soybean, urad, masoor, wheat and gram. The area under these crops are given in table 4.2.4.

In the case of small group, the gross cropped area was 170.65 hectare. Of this area, 36.74 per cent belonged to gram followed by soybean (25.20 per cent), wheat (24.40 per cent), urad (9.52 per cent) and masoor (4.14 per cent). In small group, kharif crops occupied 34.72 per cent area and rabi crops, 66.28 per cent. In remaining two groups also, the similar trend was observed. Cropping pattern of Vidisha district showed that the gram was major crop of the district and occupied highest area in cropping pattern (Table 4.2.4).

Table 4.2.4 Cropping pattern of the sample farmers of Vidisha District

(In hectares)

Size of holding	Area share and the crop (proportion to GCA) per cent					
	Crops					
	Soybean	Urad	Masoor	Wheat	Gram	GCA (In ha.)
Small	43.01	16.25	7.06	41.64	62.69	170.65
	(25.20)	(9.52)	(4.14)	(24.40)	(36.74)	(100.00)
Medium	161.68	57.65	44.95	117.35	147.20	528.83
	(30.57)	(10.90)	(8.50)	(22.19)	(27.83)	(100.00)
Large	256.99	200.00	169.25	295.01	304.69	1,225.94
	(20.96)	(16.31)	(13.80)	(24.06)	(24.85)	(100.00)
All	461.68	273.90	221.26	454.00	514.58	1,925.42
	(23.98)	(14.22)	(11.49)	(23.58)	(26.72)	(100.00)

Note : Figures in brackets denotes percentage to Gross Cropped Area

4.2.5 Production and Productivity of Pulses

In Vidisha district, three pulses grown by sample farmers were gram, urad and masoor. In the case of small size group, the total production of these three pulse crops was 783.00 quintals, 140.00 quintals and 94.00 quintals respectively. The productivity of these pulses was 12.49 quintal/ ha., 8.75 quintal/ ha. and 11.88 quintal/ ha. respectively. In the case of small group, the gross value of production of selected crops was Rs.28,41,876 at farm harvest prices prevailing in the villages at the time of survey. In the case of medium size group, the total value of production of selected crops was Rs. 83,42,682.

In large size group, the total gross value of production of selected crops at farm harvest prices prevailing in the village was Rs. 1,91,69,375.

The gross value of production of selected crops for all the selected (300) farmers was Rs. 3,03,53,933. (Table 4.2.5).

Table 4.2.5 Production and Productivity of selected crops of sample farm, Vidisha District

(Production in quintals)

Size of holding	Urad	Masoor	Gram	Soybean	Wheat	Total Gross value of Production at Farm harvest prices (Rs.)
Small	140.00 (8.75)	94.00 (11.88)	783.00 (12.49)	522.57 (12.15)	999.36 (24.00)	**28,41,876**
Medium	488.00 (8.56)	523.00 (11.62)	1,674.00 (11.37)	1,940.16 (12.00)	2,781.19 (23.70)	**83,42,682**
Large	1,655.00 (8.28)	1,935.00 (11.38)	3,506.00 (11.51)	3,058.18 (11.90)	6,829.48 (23.15)	**1,91,69,375**
All	2,283.00 (8.53)	2,552.00 (11.63)	5,963.00 (11.59)	5,520.91 (12.00)	10,610.03 (23.60)	**3,03,53,933**
FHP	1,500	1,525	1,425	1,250	720	

FHP= Farm Harvest Prices (Rs. per quintal)
Figures in brackets are productivity (Quintal per hectare)

4.2.6 Seed requirement

The total area under gram for selected small farmers was 62.69 ha and total production was 78,300 kg. For the production of this quantity, small farmers used 5,253 kg. quantity as a seed from previous year's production and 6,640 kg. quantity kept as seed from current year's production. The percentage quantity of seed used with current year's total production was 6.71. In the case of medium size group, the total area under gram was 147.2 ha. with total production of 1,67,400 kg. The selected medium farmers used 11,879 kg. of total seed and kept 17,150 kg. quantity as seed from current year's production. The percentage quantity of gram seed used with the current year's production was 7.09. The large group of farmers covered 304.69 hectare area under gram. For the production of 3,50,600 kg. of gram, the quantity of seed used by the farmers was 6.97 per cent of the

current year's production. The over all picture showed that all the farmers combined together used 6.97 per cent gram seed for the production of 5,96,300 kg. gram in 514.58 hectare of land (Table 4.2.6).

The percentage quantity of seeds kept for next year's production were 8.48, 10.24 and 10.58 by small, medium and large size farmers. In all size groups, the quantity of seed kept was more than the quantity of seed used.

Table 4.2.6 Seed requirement for Pulse (Gram), Vidisha District

Size of Holding	Area (ha.)	Production (kg.)	Quantity of Seed (kg.)		Percentage quantity of Seed with production	
			Used	Kept	Used	Kept
Small	62.69	78,300	5,253	6,640	6.71	8.48
Medium	147.20	1,67,400	11,879	17,150	7.09	10.24
Large	304.69	3,50,600	24,425	37,100	6.97	10.58
All	514.58	5,96,300	41,557	60,890	6.97	10.21

Note : Seed used means seed from previous year's production
Seed kept means seed kept from current year's production

4.2.7 Production and disposal of gram

In Vidisha district, total production of gram in small size group was 783.00 quintal. Of this production, 13.98 per cent quantity was used for home consumption and 8.48 per cent produce was kept as seed for next year's production. The percentage of produce used as animal feed and poultry feed was 4.08 per cent and 1.80 per cent respectively. In small group, the marketed surplus of gram produce was 57.32 per cent. The total marketable surplus was estimated to be 69.78 per cent.

In medium size group, total production of gram was 1,674 quintals and the marketed surplus was estimated to be (6.66 qtls.) i.e. 58.57 per cent. The quantity of seed kept for next year was 10.24 per cent, and the quantity used as animal and poultry feed was 5.36 and 0.71 per cent respectively. Only 10.90 per cent produce was used as home consumption.

The total production of gram was 3,506 quintal in large group of farmers. They kept 10.58 per cent produce as seed for next production. Only 5.86 per cent produce was kept

as home consumption. Four per cent of the produce was used as wages to labour. The quantity of produce used as animal and poultry feed was 4.88 and 0.89 per cent respectively. The marketed surplus of produce was 59.63 per cent.

The overall picture showed that of the total production of 5,963 quintals, the marketed surplus was estimated to be 59.03 per cent. Only 8.34 per cent production was used as home consumption and 10.21 per cent quantity was kept for seed. The quantity of produce used as feed by animal and poultry was 4.91 and 0.96 per cent respectively.

It was observed that as the size of holding increases, the home consumption of produce decreases, and kind wages to labour, marketable and marketed surplus increases (Table 4.2.7).

4.2.8 Consumption as Feed (gram) by Livestock

In Vidisha district, the total number of livestock with sample farmers was 1,796 (600 milch + 1196 dry). In the case of milch animals there were 311 cows and 289 buffaloes. In the case of dry animal, there were 56 cows, 41 buffaloes, 320 bullocks, 301 calves and 478 other animals. The total 367 cows consumed 10,390 kg. gram as feed. The consumption of gram per cow came to 28.31 per cent. Similarly, 330 buffaloes consumed a total quantity of 11,690 kg. gram as feed. The consumption of gram per buffaloe came to 35.42 kg. The consumption of gram per bullock was 21.08 kg. For calves, the figure was 0.38 kg.

Table 4.2.7 Production and Disposal of gram in different size of holdings

(Quantity in quintal)

Size of Holding	Total Production (quintals)	Previous year's Seed used	Kept for seed for next time	Exchange as seed	Sold for seed	Home Consumption	Kind wages to labour	Used as Animal feed	Used as Poultry feed.	Marketable surplus	Marketed surplus
Small	783.00 (100.00)	52.53 (6.71)	66.40 (8.48)	0 0	0 0	109.50 (13.98)	14.60 (1.86)	32.00 (4.08)	14.10 (1.80)	546.40 (69.78)	448.90 (57.32)
Medium	1,674.00 (100.00)	118.79 (7.09)	171.50 (10.24)	0 0	0 0	182.35 (10.90)	47.00 (2.81)	89.75 (5.36)	12.00 (0.71)	1,171.40 (69.98)	980.40 (58.57)
Large	3,506.00 (100.00)	244.25 (6.97)	371.00 (10.58)	0 0	0 0	205.50 (5.86)	140.50 (4.00)	171.00 (4.88)	31.50 (0.89)	2,586.50 (73.77)	2,090.50 (59.63)
All	5,963.00 (100.00)	415.57 (6.97)	608.90 (10.21)	0 0	0 0	497.35 (8.34)	202.10 (3.39)	292.75 (4.91)	57.60 (0.96)	4,304.30 (72.18)	3,519.80 (59.03)

Note : Figures in brackets denote percentage to total production.

When we consider the animal as a whole, then 1,796 animals consumed 29,275 kg. of gram. It means the quantity of gram consumed by each animal came to 16.30 kg. (Table 4.2.8).

Table 4.2.8 Pulses (Gram) consumed as feed by live stock

S. No.	Name of Animal	In Milk		Dry		Total consumption (Kg.)	Consumption of Crop/ Animal (Kg.)
		No.	Qty. (kg.)	No.	Qty. (kg.)		
1	Cow	311	10,380	56	10	10,390	28.31
2	Buffaloe	289	11,690	41	0	11,690	35.42
3	Bullock	0	0	320	6,745	6,745	21.08
4	Calves	0	0	301	115	115	0.38
5	Other	0	0	478	335	335	0.70
Total		600	22,070	1,196	7,205	29,275	16.30

4.2.9 Consumption as feed (gram) by poultry birds

The number of poultry birds kept by small, medium and large farmers were 333, 244, and 757 respectively. In small group, 333 poultry birds consumed 1,410 kg. of gram as feed. The consumption per bird in small group came to 4,234.23 gm. In the case of medium size group, 244 birds consumed 1,200 kg. of gram as feed, and in large group, 757 birds consumed 3,150 kg. gram. The consumption of gram per bird in medium and large size farms came to 4,918.03 gms and 4,161.16 gms respectively. Overall picture showed that 300 farmers kept a total of 1,334 poultry birds which consumed 5,760.00 kg. gram as feed. The per bird consumption of gram as feed came to 4,317.84 gm. (Table 4.2.9).

Table 4.2.9 Pulses (Gram) consumed as feed by poultry birds

S. No.	Size of Farms	Number of Birds	Feed (Kg.)	Consumption per bird (gram)
1	Small	333	1,410.00	4,234.23
2	Medium	244	1,200.00	4,918.03
3	Large	757	3,150.00	4,161.16
4	All	1,334	5,760.00	4,317.84

4.2.10 Wastage of gram at harvest and post harvest stages

In small size group, the total production of gram was 78,300 kg. About 2.55 per cent loss of grains was observed at the time of harvesting. At the time of threshing, 1 per cent loss of grain was observed on threshing floor and shattered on ground. Nearly 0.23 per cent loss of grain was observed as it left in straw. Wastage in transportation (field to threshing floor, threshing floor to storage and storage to market) was 0.37 per cent of the total production. Wastage in storage due to rats, dampness and insect pests was 2.15 per cent. Losses during home consumption due to cleanliness, cooking and eating was 0.53 per cent. Nearly 0.31 per cent feed left as unconsumed by animals and poultry during feeding. The total wastage of gram produce was 7.14 per cent in small size group. The maximum losses was observed during harvesting and storage.

In medium size group, the losses of gram at different harvest and post harvest stages was observed 6.44 per cent of the total production. The percentage of loss was highest during harvesting (2.40 per cent) followed by storage (1.81 per cent), threshing and shattered (0.95 per cent), home consumption (0.46 per cent), animal feed (0.33 per cent) and transportation (0.28 per cent).

A total of 6.31 per cent loss of gram produce was observed in large size group. In this group the total production of gram was 3,50,600 kg. The percentage wastage during harvesting, threshing and shattered, left in straw, transportation, storage, home consumption, and, animal - poultry feed were 2.32, 0.89, 0.21, 0.26, 1.74, 0.60 and 0.29 respectively.

By considering the total as a whole, the total production of gram was 5,96,300 kg. The total wastage at different harvest and post harvest stages was 6.45 per cent of the total production. The maximum loss (2.37 per cent) was observed during harvesting of the crop. At storage 1.81 per cent loss was observed (Table 4.2.10).

This table shows that the quantity of losses reduces as the size of farm increases.

Table 4.2.10 Wastage of Gram (Pulse) at different harvest and post harvest stages

Size of holding	Total production (Kg.)	Quantity (kg.) for							
		Harvesting	Threshing and Shattered	Straw	Transportation	Storage	Home Consumption	Left for Animal/ Poultry Feed	Total wastage %
Small	78,300	1,998 (2.55)	785 (1.00)	184 (0.23)	289 (0.37)	1,680 (2.15)	415 (0.53)	240 (0.31)	7.14
Medium	1,67,400	4,013 (2.40)	1,596 (0.95)	349 (0.21)	462 (0.28)	3,034 (1.81)	770 (0.46)	550 (0.33)	6.44
Large	3,50,600	8,117 (2.32)	3,135 (0.89)	751 (0.21)	908 (0.26)	6,107 (1.74)	2101 (0.60)	1,005 (0.29)	6.31
All	5,96,300	14,128 (2.37)	5,516 (0.92)	1,284 (0.22)	1,657 (0.28)	10,821 (1.81)	3,285.50 (0.55)	1,795 (0.30)	6.45

Note : Figures in brackets denote percentage to total production

4.2.11 Percentage of seed, feed and wastage in production of gram (pulse)

In small size group, the total area under gram was 62.69 hectares and total production was 78,300 kg. For the production of 78,300 kg. of gram, 5,253 kg. (6.71 per cent) of seed was used. Of the total production, 4,610 kg. or (5.89 per cent) gram produce was used as animal and poultry feed, and the wastage during harvest and different post harvest stages was 5,590 kg. or 7.14 per cent. The consumption of total production of gram as seed, feed and wastage was 15,453 kg. or 19.74 per cent. In medium size group, the consumption of total production of gram as seed used, seed kept, used as animal and poultry feed, and, wastage during harvest and post harvest stages were 7.10 per cent, 10.24 per cent, 6.08 per cent and 6.44 per cent respectively. The total consumption of production as seed, feed and wastage came to 19.62 per cent. In large size group, the cultivators produced 3,50,600 kg. of gram in 304.69 hectares of land. For the production of gram, they used 6.97 per cent seed, and kept 10.58 per cent current produce as seed for the next year's production. They also used 5.78 per cent produce as animal and poultry feed and the wastage was 6.31 per cent during harvest and post harvest stages. The consumption of gram produce as seed, feed and wastage came to 19.06 per cent. The figures for consumption of produce as seed, feed and wastage decreases as the size of holding increases.

The overall picture (300 farmers) showed that the consumption of gram produce as seed, feed and wastage came to 19.29 per cent (Table 4.2.11).

Table 4.2.11 Percentage of seed, feed and wastage in production of gram, Vidisha District

Size of Holding	Area (ha.)	Produc-tion (Kg.)	Seed used		Seed kept		Used as feed		Wastage		Consumption as seed, feed and wastage	
			Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)
Small	62.69	78,300	5,253	6.71	6,640	8.48	4,610	5.89	5,590.00	7.14	15,453.00	19.74
Medium	147.20	1,67,400	11,879	7.10	17,150	10.24	10,175	6.08	10,773.50	6.44	32,827.50	19.62
Large	304.69	3,50,600	24,425	6.97	37,100	10.58	20,250	5.78	22,123.00	6.31	66,798.00	19.06
All	514.58	5,96,300	41,557	6.97	60,890	10.21	35,035	5.87	38,486.50	6.45	1,15,078.50	19.29

4.3 Value of crop out put

Value of crop output is derived by multiplying the total production of crop and farm harvest price of that crop. The value of first crop (wheat) in small size group was Rs. 13,53,212.50 followed by Rs. 31,84,925 in medium size and Rs.64,78,600 in large size group. The total gross value of wheat was Rs.1,10,16,738.

In the case of second crop (gram), the value of crop output in small group was Rs.11,15,775. In medium and large size group, the value of crop out was Rs.23,85,450 and Rs. 49,96,050 respectively. The total gross value of gram was Rs.84,97,275.

The total gross value of wheat and gram combined together for the selected farmers was Rs.1,95,14,013.00 (Table 4.3).

Table 4.3 Value of crop output for wheat and gram

Size of Holding	Crop (Value = Total production x Farm harvest price		Total Gross value of crop out put (Rs.)
	Crop 1 (**Wheat**) (Rs.)	Crop 2 (**Gram**) (Rs.)	
Small	13,53,212.50	11,15,775.00	24,68,987.50
Medium	31,84,925.00	23,85,450.00	55,70,375.00
Large	64,78,600.00	49,96,050.00	1,14,74,650.00
Total	1,10,16,738.00	84,97,275.00	1,95,14,013.00
FHP (Rs./ Qtl.)	725	1,425	

FHP = Farm Harvest Price

4.4 Crop wise percentage of seed, feed and wastage in production of Wheat and Gram

In the case of wheat, the consumption of wheat produce as seed, feed and wastage was 15.13 per cent. Similarly in the case of Gram, the consumption of gram produce as seed, feed and wastage was 19.29 per cent. Among seed, feed and wastage, the share of wastage was highest in both the crop (6.45 per cent) (Table 4.4).

Table 4.4 Crop wise percentage of seed, feed and wastage in production of wheat and gram

Crop	Area (ha.)	Production (Kg.)	(1)		(2)		(3)		(4)		(1+3+4)	
			Seed used		Seed kept		Used as feed		Wastage		Consumption as seed, feed and wastage	
			Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)
Wheat	599.99	1519550	75368	4.96	88050	5.79	56750	3.73	97875	6.44	229993	15.13
Gram	514.58	596300	41557	6.97	60890	10.21	35035	5.87	38486.50	6.45	115078.50	19.29

4.5 Availability of wheat for human consumption

Availability of wheat for human consumption is derived by deducting the "consumption of production as seed, feed and wastage" from total production of wheat. In small size group, of the total production, the availability of wheat for human consumption was about 81 per cent. In Medium and large size group, the availability of wheat for human consumption was 83.06 per cent and 86.55 per cent respectively. The overall net availability of wheat for human consumption was 84.87 per cent of the total production (Table 4.5).

Table 4.5 Net availability of Wheat (Cereal) for human consumption

Size of holding	Area (ha.)	Total Production (kg.)	Consumption of production as seed, feed and wastage (kg.)	Availability of wheat for human consumption (kg.)
Small	78.56	1,86,650 (100.00)	35,384 (18.96)	1,51,266 (81.04)
Medium	175.46	4,39,300 (100.00)	74,420 (16.94)	3,64,880 (83.06)
Large	345.97	8,93,600 (100.00)	1,20,188 (13.45)	7,73,412 (86.55)
All	599.99	15,19,550 (100.00)	2,29,993 (15.13)	12,89,557 (84.87)

Note : Figures in brackets denotes percentage to total production

4.6 Availability of Gram for human Consumption

The overall availability of gram for human consumption was 80.71 per cent of the total production. For small, medium and large size groups, the availability of gram for human consumption was nearly 80 per cent (Table 4.6).

Table 4.6 Net availability of Gram (Pulses) for human consumption

Size of holding	Area (ha.)	Total Production (kg.)	Consumption of production as seed, feed and wastage (kg.)	Availability of gram for human consumption (kg.)
Small	62.69	78,300 (100.00)	15,453.00 (19.74)	62,847.00 (80.26)
Medium	147.20	1,67,400 (100.00)	32,827.50 (19.62)	1,34,572.50 (80.38)
Large	304.69	3,50,600 (100.00)	66,798.00 (19.06)	2,83,802.00 (80.94)
All	514.58	5,96,300 (100.00)	1,15,078.50 (19.29)	4,81,221.50 (80.71)

Note : Figures in brackets denotes percentage to total production

4.7 Net availability of foodgrain (wheat + gram) for human consumption

In the case of wheat crop, the availability of grain for human consumption came to 84.87 per cent. Similarly, in the case of gram, net availability for human consumption was 80.71 per cent. Of the total production of 21,15,850 kg. of (wheat + gram) foodgrain, the availability of foodgrain for human consumption was17,70,778.50 kg. or 83.69 per cent of the total production (Table 4.7).

Table 4.7 Net availability of foodgrains (wheat + gram) for human consumption

Crop	Total Area (ha.)	Total Production (Kg.)	Consumption of Production as Seed, Feed and Wastage (kg.)	Availability of wheat and gram for human consumption (Kg.)	Net availability of wheat and gram for human consumption (Kg.)
Wheat	599.00	15,19,550 (100.00)	2,29,993 (15.13)	12,89,557 (84.87)	589.38
Gram	514.58	5,96,300 (100.00)	1,15,078 (19.29)	4,81,221.50 (80.71)	249.08
All (Food grain)	1114.57	21,15,850	3,45,071 (16.31)	17,70,778.50 (83.69)	429.80

Note : Figures in brackets denotes percentage to total production

The total population (members) in the house of selected farmers of Rewa district for wheat was 2188. This figure for Vidisha district selected for gram was 1932. The number of total members (population) in these two selected districts was 4120. For the calculation of net availability of wheat, gram and food grains for human consumption, the total availability of these crops are divided by the total number of members (population) in the house of the selected farmers of the respective crops. The net availability of wheat, gram and foodgrain (wheat + gram) for human consumption came to 589.38 kg., 249.08 kg. and 429.80 kg. respectively.

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CHAPTER –V

SUMMARY AND CONCLUSIONS

India is a country of about one billion people. More than 70 per cent of India's population lives in rural areas where the main occupation is agriculture. In India, agriculture continues to be the engine of economic growth. Of all the food articles, foodgrains constitute the most significant part of the Indian diet. Nearly 60 per cent of an average Indian's income gets spent on food grains. Self-sufficiency in foodgrains would, therefore, remain an integral part of Government Policy in times to come. It may be mentioned that in the coming years the requirement for seed and allowances for wastage would be somewhat lower on account of technological development and scientific management of farm activities. On the other hand, there is a distinct possibility of higher demand for feed in view of expansion of livestock sector for the production of milk, eggs, meat and wool. However, only selected grades of foodgrains say maize, and pulses could be utilised as feed.

The recent slow down in the grain output raises concerns about the growth of agricultural sector. It has been estimated that India's demand for foodgrains in 2020 will be 351 million tonnes assuming 5.5 per cent growth in per capita income. If economic growth is also accompanied by significant reduction in the proportion of poor people, demand could further increase to 370 million tonnes by 2020. Therefore, the surging growth of demand for food must be met with largely through technological change in agriculture because of the limited option to expand the land area.

Safe storage of foodgrains is as important as production of foodgrains. However, storage losses still continue to be quite high in India. The state of Madhya Pradesh is no exception. In fact, storage losses in Madhya Pradesh are considered to be higher than the All-India average. This is so because storage facilities available in this state are far from satisfactory. Recognising this fact, the Department of Food of the Govt. of India in cooperation with the State Government launched the "Save Grain Compaign" (SGC) in

Madhya Pradesh in 1973. This was intended to create awareness among rural masses about the extent of losses and a need for adopting scientific storage practices.

The total preventable (post harvest) losses of foodgrains are about 20 million tonnes in a year in our country. That is roughly the amount of foodgrains Australia produces annually. The foodgrains wasted in India during the year 1998-99 could have fed upto 117 million people for a year or the entire country for almost six weeks.

In country like India, where about 26 per cent of the population live below poverty line, these foodgrains losses are a criminal wastage. There is no doubt that these losses can not be brought at the zero level but can be significantly reduced through better management and infrastructure. Looking to the importance of study, the Ministry of Agriculture, Govt. of India asked the Agro-Economic Research Centres to conduct a study on the Estimation of Seed, Feed and Wastage Ratios for Major Foodgrains. The Agro-Economic Research Centres for M.P. and Chhattisgarh has taken up this study in Madhya Pradesh.

The objectives of the study are : to estimate the total quantity of foodgrains consumed for seed, feed and wastage, and, to estimate the net availability of foodgrains for human consumptions.

General Characteristics of the State, districts and selected Regions

For the purpose of field level study, two crops namely wheat (cereal) from Rewa district and Gram (pulses) from Vidisha district of Madhya Pradesh were selected. A brief description for the state, districts and selected tehsils/ blocks would be useful.

Madhya Pradesh

The present State of Madhya Pradesh came into existence on 1st November 2000 when a separate state of Chhattisgarh was carved out of the old Madhya Pradesh. The total geographical area of the State is now 307.56 thousand sq. kms. which is 9.4 per cent of the total geographical area of the country. The State has 9 revenue divisions, 48 districts, 272

tehsils, 313 community development blocks, 394 town/ cities and 55,392 villages. The total population of the State (Census 2001) was 603.85 lakhs forming 5.88 per cent of the country's population. The percentage of male and female population was 52.15 and 47.85 respectively. The State is basically rural in nature as 73.50 per cent of the total population resides in villages. Of the total population, 42.75 per cent population belonged to total workers and remaining 57.25 per cent, non worker. Of the total workers, 42.93 per cent were cultivators, 28.86 per cent agricultural labourers and remaining 28.41 per cent other workers.

The literacy in urban population was 79.67 per cent and in rural population was 58.10 per cent.

Nearly 21.65 per cent area of the State was operated by 60.45 per cent marginal and small farmers. On the other hand, 54.54 per cent land was operated by only 17.95 per cent larger group of farmer (medium and large). The average size of holding of the State was 2.51 hectares. Of the total geographical area of the State, 47.54 per cent of it was net area sown. The area of forest was 27.89 per cent. The gross cropped area of the State was 181.81 hectares with a cropping intensity of 124 per cent. Of the gross cropped area, rabi crops occupied 40.99 per cent and kharif crops, 59.01 per cent. Food and non-food crops occupied 64.97 and 35.03 per cent respectively. The net irrigated area of the State was 4494.30 thousand hectares and gross irrigated area was 4631.0 thousand hectares with irrigation intensity of 103.04 per cent. Total livestock comprised mainly of cattle (56.23 per cent), goat (19.83 per cent), buffaloes (19.68 per cent), sheep (2.34 per cent) and pigs (1.48 per cent).

The cropping pattern of the State was food crop oriented as this group occupied 64.97 per cent of the gross cropped area. Among food crops, the share of foodgrains was 62.74 per cent, cereals was 39.91 per cent and pulses, 22.83 per cent. Among cereals, wheat occupied highest area (18.60 per cent). Non- food crops occupied 35.03 per cent area of the gross cropped area. The share of soybean was 23.05 per cent of the gross cropped area.

The important cereals of the State were paddy, maize, jowar and wheat. The major pulses were gram, arhar, lentil, urad and pea. Among oilseeds, soybean, rapeseed - mustard groundnut and linseed were important.

The most important irrigated crop of the State was wheat which occupied 52.65 per cent of the irrigated area. Gram was another important irrigated crop occupying 23.08 per cent, followed by paddy (4.81 per cent), fruits and vegetable (3.35 per cent).

Rewa District

Rewa district is located in the extreme northern part of the State. It comes under "Kymore Plateau and Satpura Hills" agro-climatic region. It occupied on area of 6,314 sq.km. It has 7 tehsils, 9 blocks, 827 village panchayats and 2,415 villages. The total population of the district was 1,972.33 thousands included 51.58 per cent male and 48.42 per cent female. It had 83.75 per cent rural population and 16.25 per cent urban population. scheduled Castes and Scheduled Tribes formed 15.58 and 12.88 per cent of the total population. The sex ratio was 939. District population had 43.79 per cent of the total workers. The cultivators, agricultural labourers and other workers formed 43.39 per cent, 34.90 per cent and 16.97 per cent of the total workers respectively. The literacy percentage was 62.33. In this district, 2,10,578 land holders occupied a total area of 4,36,870 hectares.

Of the total geographical area (Rewa) of 628.74 thousand hectares the net area sown was 58.61 per cent. Forest covered 13.57 per cent area. The gross cropped area was 494.28 thousand hectares and cropping intensity was 134 per cent. The food crops and non food crops covered 92.61 per cent and 7.39 per cent area of the gross cropped area. Of the gross cropped area, 91.70 thousand hectare were irrigated. The main sources of irrigation were wells, contributed 33.30 per cent of the net irrigated area followed by tubewells (27.00 per cent), canals (14.30 per cent) and tanks (1.50 per cent). Irrigation intensity was 101.44 per cent. Of the total livestock of 1,113.97 thousands, cattle forms (65.50 per cent), goats (15.23 per cent), buffaloes (15.04 per cent), and pigs (2.18 per cent). Poultry birds constituted 91.03 thousand numbers.

The cropping pattern of Rewa district was rabi dominated as this group of crops occupied 58.02 per cent of the gross cropped area. Food crops occupied 92.61 per cent area. The share of foodgrains was 91.55 per cent. Among foodgrains, total cereals occupied 68.89 per cent. Among cereals, wheat occupied 33.97 per cent and paddy 28.47 per cent. The major crops of the district were wheat, paddy, gram, jowar, linseed and soybean. The gross irrigated area of the district was 91.70 thousand hectares. Wheat was the most important

irrigated crop occupied 84.06 per cent of the gross irrigated area. Wheat was the crop irrigated to the extent of 45.91 per cent.

Vidisha District

For pulse crop (gram), Vidisha district was selected. The total geographical area of the district was 7,371 sq.km. It had 7 tehsils, 7 blocks, 549 village panchayats and 1,522 villages with a population of 1,214.86 thousands (Census 2001). Of the total population, male and female population formed 53.33 per cent and 46.67 per cent respectively. The percentage of rural and urban population were 78.57 and 21.43 per cent respectively. Scheduled castes and Scheduled tribes population formed 19.85 and 4.88 per cent of the total population. The remaining population belonged to "other" caste. The percentage of total workers to total population was 37.12. Cultivators, agricultural labourers and other workers formed 37.60, 37.09 and 22.96 per cent respectively of the total worker (4,50,975). The literacy percentage was 62.10. The literacy percentage in male, female, urban and rural population were 74.71, 47.45, 78.08 and 57.53 per cent respectively.

In Vidisha district, 1,22,593 land holders occupied an area of 5,39,562 hectares. The average size of holding was 4.40 hectares. Marginal and small holdings formed 42.82 per cent of the total number of holdings, but occupied only 9.78 per cent of the area. Big land holders (medium + large) formed 33.40 per cent of the total number of holding but commanded a comparatively larger percentage of area (74.73). Total geographical area of the district was 730.19 thousand hectares. Forest occupied 14.86 per cent area and net area sown was 74.22 per cent of the total geographical area. The gross cropped area of the district was 656.66 thousand hectares. Of the gross cropped area, rabi and kharif crops occupied 79.25 percent and 20.75 per cent respectively, and, food and non food crops occupied 81.49 per cent and 18.51 per cent respectively. The cropping intensity was 121.16 per cent.

Tube wells were the most important sources of irrigation commanded 33.78 per cent of the net irrigated area of 186.20 thousand hectares. Canal commanded 18.74 per cent followed by wells (15.09 per cent) and tanks (0.97 per cent). The irrigation intensity was 100 per cent. Of the total livestock (475.35 thousands), cattle formed 56.00 per cent, goat (21.39

per cent), buffaloes (19.87 per cent). Poultry birds also constituted significant (120.79 thousands) number in the district.

The cropping pattern of Vidisha district was rabi crop dominated covered 79.25 per cent of the gross cropped area. Food and non food crops covered 81.49 and 18.51 per cent respectively. Cereals and pulses (total foodgrains) dominated the cropping pattern occupied 80.37 per cent of the gross cropped area. Among pulses, gram occupied 30.79 per cent area of the gross cropped area. The cropping pattern of the district was food crops dominated. The most important irrigated crop of the district was wheat occupied 47.09 per cent of the irrigated area under all crops. Gram was another important irrigated crop occupied 45.85 per cent. Gram was irrigated to the extent of 42.24 per cent followed by wheat (37.65 per cent).

Selected tehsils/ blocks of Rewa and Vidisha Districts

For the study of wheat crop, four tehsils/ blocks of Rewa district namely Raipur Karchulian, Sirmour, Hanumana and Rewa having maximum area under wheat were selected. The cropping pattern of all the four selected blocks of Rewa district was food crop oriented. Food crop occupied more than 85 per cent area of the total cropped area. In all the blocks, the area under total cereal, was more than 60.00 per cent. Wheat was the major cereal of Rewa district. It occupied more than 36 per cent area of the gross cropped area in all the blocks except Hanumana block, where wheat crop occupied nearly 30 per cent area.

The net irrigated area was highest in Rewa tehsil/ block followed by Sirmour (tehsil/ block), Raipur karchulian (tehsil/ block) and Hanumana (tehsil/ block). In Rewa tehsil/ block, tubewell was the major source of irrigation covered 64.65 per cent area of the net irrigated area. In Hanumana tehsil/ block, Canal was the major source of irrigatioin occupied 63.88 per cent area of the net irrigated area by all sources. In Sirmour tehsil/ block, major sources of irrigation were wells (27.15 per cent), followed by tubewells (26.43 per cent) and canals (18.63) per cent. In Raipur karchulian tehsil/ block, tubewell (62.11 per cent) was the main sources of irrigation followed by wells and other sources.

For the study of pulse crop (gram), four tehsils / blocks namely Basoda, Nateran, Kurwai and Sironj were selected from Vidisha district having maximum area under gram

(pulse crop). Among four tehsils/ blocks, the gross cropped area was maximum in Basoda (114.55 thousand hectares) followed by Sironj (112.77 thousand hectares), Nateran (103.25 thousand hectares) and Kurwai (91.11 thousand hectares). The maximum cropping intensity was observed in Nateran (135.49 per cent) followed by Kurwai (127.44 per cent), Sironj (126.25 per cent) and Basoda (119.75 per cent). The maximum population was observed in Basoda followed by Sironj, Nateran and Kurwai. The density of population was highest in Basoda (198 person/ sq.km.) followed by kurwai (165), Sironj (154) and Nateran (145). In all the tehsils, the number of male population was more than the female population. All the tehsils/ blocks of Vidisha district were rural dominated. In all the four blocks the number of non working population was more than the working population.

The cropping pattern of all the selected blocks of the district was food crop oriented and rabi crops dominated. Among foodgrains, pulses occupied highest area in all the selected tehsils. Among pulses, gram occupied highest area in all the selected blocks. In all the tehsils/ blocks, gram occupied nearly 30 per cent of the gross cropped area.

Methodology

For this study, a three stage stratified random sampling design was used to select the block, village and farmers. The State of Madhya Pradesh was selected purposively. Out of 48 districts of the State, Rewa district was selected for cereals as the area under it was highest in this district. Vidisha district was selected for pulses as the area under it was highest in this district. From Rewa district one cereal crop (wheat) was selected for the study as this crop occupied highest area in cereal group. Similarly, from Vidisha district one pulse crop (Gram) was selected as it occupied highest area in pulse group. From each selected districts, four tehsils/ blocks were selected on the basis of highest area under respective crops. From each selected block, 5 villages were selected in consultation with Deputy Director of Agriculture of the concerned districts. From each selected village, a sample of 15 farmers (5 farmers from each size group i.e. small (0-2 ha.), medium (2.01 ha.- 4.00 ha.) and large group (above 4.00 ha.) were randomly selected from the referred list by adjusting the available size classes. In this way, a sample of 75 farmers from 5 villages were selected and a total of 300 farmers from 20 villages of 4 tehsils/ blocks were selected. In this way, a total of 600 farmers,

comprising 300 farmers for wheat from Rewa district and 300 farmer for Gram from Vidisha district were selected. The reference year for the study was agricultural years 2004-05. Both primary and secondary data were collected. Primary data was collected from all the sample farmers by using a well designed pre- tested questionnaire by personal interview method.

Simple averages and percentages were used for the estimation of seed (used and kept for next year), feed (feed fed to bovines and poultry) and wastage ratios for food grain production at different stages.

Main Findings

The main finding for two selected crops i.e. wheat and gram are present\ed separately.

Wheat (Cereal) – District Rewa

(1) The survey of wheat farmers covered 20 villages from 4 blocks of Rewa district. The total number of farmers in the 20 selected villages were 4,230. Of this, the highest number (3,066) of farmers belonged to small group followed by medium group (747) and large group (417).

(2) The survey showed that the average number of family members per household was 7.29. In small size group it was 6.83, in medium group, 7.79 and in large size group, 7.26.

(3) The overall average size of holding of the district was 3.20 hect. The average size of holding for small, medium and large farmers were 0.76 hectare, 2.61 hect. and 6.24 hectares respectively.

(4) None of the selected farmers adopted the practice of leased in / leased out of land in Rewa district.

(5) Among 300 households selected from Rewa district, 124 belonged to “OBC” group, 122 belonged to “Other” group and remaining 54 belonged to “Scheduled Caste” group. None of the sample farmers belonged to “Scheduled tribes” group.

(6) The overall average size of holdings for the selected (300) farms was 3.45 hectares. For small size group, the average size of holding was 1.01 hectares followed by medium farms (3.06 hectares) and large farms (6.28 hect.)

(7) Wheat was the major crop of Rewa district which occupied highest area in cropping pattern. The total area under wheat for all sample farmers was estimated at 599.99 hectare. Of this, nearly 60 per cent was grown as irrigated.

(8) On sample farms, the area under wheat in all size group was highest. In small group, wheat occupied 42.48 per cent area of the gross cropped area. For medium and large farms, these figures were 31.94 per cent and 30.59 per cent respectively.

(9) The production of wheat for total sample farmers was estimated at 15,19,550 Kg. Out of which, 4.96 per cent quantity of wheat was used as seed.

(10) The overall productivity of wheat was 25.33 qt./ hect. In small group, the productivity of wheat was 23.76 qt./hact. It was 25.04 qt. /ha. in medium group and 25.83 qt./ha. in large size group. The productivity of wheat increases as the size of farm increases.

(11) The total requirement of wheat for farm family consumption (retention for consumption at farmer's level) was estimated at 2,44,900 kg., which accounted for 16.11 per cent of the total production. The quantity of grains retained for consumption was 2449 Qtls or 16.11 per cent of the total production of wheat.

(12) The percentage of retention of wheat for consumption at farm level was highest (39.60 per cent) in small group and lowest (9.72 per cent) in large size group. It indicated that quantity of grains kept for home consumption decreases as the size of farm increases.

(13) The estimates of retention of wheat for various purposes were as under

(a)	Kept for seed purpose	-	5.80 per cent
(b)	Kind wages to labour	-	4.14 per cent
(c)	For animal feed	-	3.43 per cent
(d)	For poultry feed	-	0.28 per cent

(14) The total marketed surplus for wheat was estimated to be 57.64 per cent. In the case of small farms, the percentage of marketed surplus was 35.69 per cent. The marketed surplus increases as the size of farms increases. It was estimated at 51.88 per cent in medium farms and 64.96 per cent in large farms.

(15) The survey showed that a total number of 1,759 livestock consumed 52,350 kg. of wheat as feed. The consumption of wheat grain per animal was estimated at 29.76 kg. The quantity of consumption of wheat as feed per animal was highest (60.16 kg.) in the case of buffaloe followed by cow (36.77 kg.) and bullock (26.50 kg.).

(16) A total quantity of 4,400 kg. of wheat grains was consumed by 735 poultry birds. The consumption per bird was estimated at 5,986 gms. Consumption per bird (8,738 gms.) was highest in small farms and lowest (4,545gms.) in large farms.

(17) The overall wastage of wheat production at different harvest and post harvest stages was estimated at 6.41 per cent. It was 8.17 per cent in the case of small farms, 6.84 per cent in medium farms and 5.88 per cent in large farms. The maximum losses of grains was occurred at the time of harvesting of crop (2.27 per cent) followed by storage losses (1.98 per cent) due to rat, moisture, insect pest etc. Nearly 0.35 per cent grain was wastage during transportation. The quantity of feed unconsumed by (animal and poultry) livestock was estimated at 0.22 per cent. The survey showed that the storage losses was highest (3.12 per cent) on small farms, followed by medium farms (2.28 per cent) and large farms (1.60 per cent). Wastage during home consumption was estimated at 0.85 per cent in the case of small farms followed by medium farms (0.44 per cent) and large farms (0.26 per cent).

(18) The consumption of wheat as seed, feed and wastage was estimated at 18.96 per cent on small farms, 16.94 per cent on medium farms and 13.45 per cent on large farms. The survey showed that the consumption of wheat grains as seed, feed and wastage decreases as the size of holding decreases. As the size of farms increases, the percentage of wastage decreases.

Gram (Pulses) – District Vidisha

1. The survey of Gram farmers covered 20 villages from 4 blocks of Vidisha district. The total numbers of farmers in 20 selected villages were 3007. Of this the highest number (1,875) of farmers belonged to small group followed by medium group (620) and large group (512).

2. The survey showed that the average number of family members per household was 6.44. For small size group it was 5.47. For medium and large size group the numbers of

family members per household were 6.83 and 7.02 respectively. It showed that the number of family member per household increases as the size of holding increases.

3. The overall average size of holding of Vidisha District was 3.47 Hectares. In the case of small, medium and large farmers, the average size of holdings were 1.01 hect. 2.88 hect. and 6.52 hect. respectively.

4. In Vidisha district, not a single farmer adopted the practice of leased in / leased out of land.

5. From 300 households selected for gram in Vidisha district, 209 farmers belonged to "Others" group, 66 farmers belonged to "OBC." group and remaining 25 farmers belonged to " Scheduled Caste" group. None of sample farmers belonged to " Scheduled Tribes" group.

6. The overall average size of holdings for the 300 selected farmers was 3.79 hectares. In the case of small size group, the average size of holding was 0.99 hectares followed by medium farms, 2.95 hectares and large farms, 7.42 hectares.

7. Gram was the major pulse crop of Vidisha district covered (26.72 per cent) highest area in cropping pattern. The total area under gram for all the sample farmers was estimated at 514.58 hectares. Of this area, about 61 per cent was grown as irrigated.

8. On sample farms, the area under gram was highest in all size groups. It occupied 36.74 per cent area of the gross cropped area in the case of small size farms. For medium and large size farms, these figures were 27.83 per cent and 24.85 per cent respectively.

9. The total production of gram on sample farms was estimated at 5,96,300 kg. Out of which, 6.97 per cent of total production of gram was used as seed. The quantity kept as seed for next year's production was 10.21 per cent.

10. The overall productivity of gram was 11.59 qt./ ha. In small group, the productivity of gram was 12.49 qt./ ha. It was 11.37 qt./ ha. in medium size group and 11.51 qt./ha. in large size group. The survey showed that the productivity of gram increases as the size of farms increases.

11. The total requirement of gram for farm family consumption (retention for consumption at farmer's level) was estimated at 49,735 Kg., which accounted for

8.34 per cent of the total production of gram. The total quantity of gram retain for consumption was 59,735 kg.

12. The percentage of retention of gram for consumption at farm level was highest (13.98 per cent) in small farms and lowest (5.86 per cent) on large farms. It showed that the quantity of gram kept for home consumption decreases as the size of farm increases.

13. The estimates of retention of gram for various purposes were as under

(a) kept for seed purpose	-	10.21 per cent
(b) Kind wages to labour	-	3.39 per cent
(c) For animal feed	-	4.91 per cent
(d) For poultry feed	-	0.96 per cent

14. The total marketed surplus for gram was estimated to be 59.03 per cent. In the case of small farms, the percentage of marketed surplus was 57.32 per cent followed by medium farms (58.57 per cent) and large farms (59.63 per cent). The marketed surplus increases as the size of farms increases.

15 The findings of the study showed that a total number of 1,796 livestock consumed 29,275 kg. of gram as feed. The consumption of gram per animal was estimated at 16.30 kg. The quantity of gram as feed per animal was highest (35.42 kg.) in the case of buffaloe followed by cow (28.31 kg.) and bullock (21.08 kg.)

16. A total quantity of 5,760 kg of gram was consumed by 1,334 poultry birds. The consumption per bird was estimated at 4,317.84 gms. The consumption of gram per bird was highest (4,918.03 gms) on medium farms and lowest (4,161.16 gms) on large farms.

17. The overall wastage of gram production at different harvest and post harvest stages was estimated at 6.45 per cent. It was highest (7.14 per cent) on small farms and lowest (6.31 per cent) on large farms.

18. The maximum loss of gram was occured at the time of harvesting of crop (2.37 per cent) followed by storage losses (1.81 per cent) due to rat and insect-pest. Nearly 0.92 per cent wastage was observed at the time of threshing and shattered on ground. About 0.22 per cent produce was left in straw. During animal feed, 0.30 per cent losses was observed.

During home consumption, 0.55 per cent produce was lost. During transportation, 0.28 per cent wastage was observed. In the case of storage, the highest loss of gram was observed on small farms followed by medium and large farms. During home consumption, the maximum loss was observed on large farms followed by small farms and medium farms.

19. The consumption of gram as seed, feed and wastage was estimated at 19.06 per cent on large farms, 19.62 per cent on medium farms and 19.74 per cent on small farms. The total wastage of gram on small farms was estimated at 7.14 per cent followed by medium farms (6.44 per cent) and on large farms (6.31 per cent).

Foodgrains (wheat + gram)

1. In the case of wheat, the total gross value of crop output was Rs. 1,10,16,738 and in the case of gram, it was Rs. 84,97,275. The total gross value of these two crops was estimated at Rs. 1,95,14,013 .

2. The survey showed that the overall availability of wheat for human consumption was 84.87 per cent of the total production. On small, medium and large size farms, the availability of wheat for human consumption was 81.04 per cent, 83.06 per cent and 86.55 per cent respectively.

3. The overall availability of gram for human consumption was 80.71 per cent of the total production. It was more or less same in all the size group i.e. about 80 per cent.

4. Of the total production of foodgrains (wheat + gram), the consumption of production as seed, feed and wastage was observed, 16.31 per cent and the availability of foodgrains (wheat + gram) for human consumption was 83.69 per cent of the total production.

5. The finding showed that the net availability of wheat, gram and foodgrain (wheat + gram) for human consumption came to 589.38 kg., 249.08 kg. and 429.80 kg. respectively.

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EXECUTIVE SUMMARY

1. Introduction

In India, agriculture continues to be the engine of economic growth. Of all the food articles, foodgrains constitute the most significant part of the Indian diet. Nearly 60 per cent of an average Indian's income gets spent on food grains. Self-sufficiency in foodgrains would, therefore, remain an integral part of Government Policy in times to come. It may be mentioned that in the coming years the requirement for seed and allowances for wastage would be somewhat lower on account of technological development and scientific management of farm activities. On the other hand, there is a distinct possibility of higher demand for feed in view of expansion of livestock sector for the production of milk, eggs, meat and wool. The recent slow down in the grain output raises concerns about the growth of agricultural sector. It has been estimated that India's demand for foodgrains in 2020 will be 351 million tonnes assuming 5.5 per cent growth in per capita income. If economic growth is also accompanied by significant reduction in the proportion of poor people, demand could further increase to 370 million tonnes by 2020. Therefore, the surging growth of demand for food must be met with largely through technological change in agriculture because of the limited option to expand the land area.

Safe storage of foodgrains is as important as production of foodgrains. However, storage losses still continue to be quite high in India. The state of Madhya Pradesh is no exception. In fact, storage losses in Madhya Pradesh are considered to be higher than the All-India average. This is so because storage facilities available in this state are far from satisfactory. Recognising this fact, the Department of Food of the Govt. of India in cooperation with the State Government launched the "Save Grain Compaign" (SGC) in Madhya Pradesh in 1973. This was intended to create awareness among rural masses about the extent of losses and a need for adopting scientific storage practices.

The total preventable (post harvest) losses of foodgrains are about 20 million tonnes in a year in our country. That is roughly the amount of foodgrains Australia produces annually. The foodgrains wasted in India during the year 1998-99 could have fed upto 117 million people for a year or the entire country for almost six weeks. In country like India, where about 26 per cent of the population live below poverty line, these foodgrains losses are

a criminal wastage. There is no doubt that these losses can not be brought at the zero level but can be significantly reduced through better management and infrastructure.

Looking to the importance of study, the Ministry of Agriculture, Govt. of India asked the Agro-Economic Research Centres to conduct a study on the Estimation of Seed, Feed and Wastage Ratios for Major Foodgrains. The Agro-Economic Research Centres for M.P. and Chhattisgarh has taken up this study in Madhya Pradesh.

2. Objectives

The objectives of the study are :

1. To estimate the total quantity of foodgrains consumed for seed, feed and wastage.
2. To estimate the net availability of foodgrains for human consumptions.

3. General Characteristics of the State, districts and selected Regions

For the purpose of field level study, two crops namely wheat (cereal) from Rewa district and Gram (pulses) from Vidisha district of Madhya Pradesh were selected. A brief description for the state, districts and selected tehsils/ blocks would be useful.

3.1 Madhya Pradesh

The present State of Madhya Pradesh came into existence on 1st November 2000 when a separate state of Chhattisgarh was carved out of the old Madhya Pradesh. The total geographical area of the State is now 307.56 thousand sq. kms. which is 9.4 per cent of the total geographical area of the country. The State has 9 revenue divisions, 48 districts, 272 tehsils, 313 community development blocks, 394 town/ cities and 55,392 villages. The total population of the State (Census 2001) was 603.85 lakhs forming 5.88 per cent of the country's population. The percentage of male and female population was 52.15 and 47.85 respectively. The State is basically rural in nature as 73.50 per cent of the total population resides in villages. Of the total population, 42.75 per cent population belonged to total workers and remaining 57.25 per cent, non worker. Of the total workers, 42.93 per cent were cultivators, 28.86 per cent agricultural labourers and remaining 28.41 per cent other workers. The literacy in urban population was 79.67 per cent and in rural population was 58.10 per cent.

Nearly 21.65 per cent area of the State was operated by 60.45 per cent marginal and small farmers. On the other hand, 54.54 per cent land was operated by only 17.95 per cent larger group of farmer (medium and large). The average size of holding of the State was 2.51 hectares. Of the total geographical area of the State, 47.54 per cent of it was net area sown. The area of forest was 27.89 per cent. The gross cropped area of the State was 181.81 hectares with a cropping intensity of 124 per cent. Of the gross cropped area, rabi crops occupied 40.99 per cent and kharif crops, 59.01 per cent. Food and non-food crops occupied 64.97 and 35.03 per cent respectively. The net irrigated area of the State was 4494.30 thousand hectares and gross irrigated area was 4631.0 thousand hectares with irrigation intensity of 103.04 per cent. Total livestock comprised mainly of cattle (56.23 per cent), goat (19.83 per cent), buffaloes (19.68 per cent), sheep (2.34 per cent) and pigs (1.48 per cent).

The cropping pattern of the State was food crop oriented as this group occupied 64.97 per cent of the gross cropped area. Among food crops, the share of foodgrains was 62.74 per cent, cereals was 39.91 per cent and pulses, 22.83 per cent. Among cereals, wheat occupied highest area (18.60 per cent). Non- food crops occupied 35.03 per cent area of the gross cropped area. The share of soybean was 23.05 per cent of the gross cropped area. The most important irrigated crop of the State was wheat which occupied 52.65 per cent of the irrigated area.

3.2 Rewa District (For wheat)

Rewa district is located in the extreme northern part of the State. It comes under "Kymore Plateau and Satpura Hills" agro-climatic region. It occupied on area of 6,314 sq.km. It has 7 tehsils, 9 blocks, 827 village panchayats and 2,415 villages. The total population of the district was 1,972.33 thousands included 51.58 per cent male and 48.42 per cent female. It had 83.75 per cent rural population and 16.25 per cent urban population. scheduled Castes and Scheduled Tribes formed 15.58 and 12.88 per cent of the total population. The sex ratio was 939. District population had 43.79 per cent of the total workers. The cultivators, agricultural labourers and other workers formed 43.39 per cent, 34.90 per cent and 16.97 per cent of the total workers respectively. The literacy percentage was 62.33. In this district, 2,10,578 land holders occupied a total area of 4,36,870 hectares.

Of the total geographical area (Rewa) of 628.74 thousand hectares the net area sown was 58.61 per cent. Forest covered 13.57 per cent area. The gross cropped area was 494.28 thousand hectares and cropping intensity was 134 per cent. The food crops and non food crops covered 92.61 per cent and 7.39 per cent area of the gross cropped area. Of the gross cropped area, 91.70 thousand hectare were irrigated. The main sources of irrigation were wells, contributed 33.30 per cent of the net irrigated area followed by tubewells (27.00 per cent), canals (14.30 per cent) and tanks (1.50 per cent). Irrigation intensity was 101.44 per cent. Of the total livestock of 1,113.97 thousands, cattle forms (65.50 per cent), goats (15.23 per cent), buffaloes (15.04 per cent), and pigs (2.18 per cent). Poultry birds constituted 91.03 thousand numbers.

The cropping pattern of Rewa district was rabi dominated as this group of crops occupied 58.02 per cent of the gross cropped area. Food crops occupied 92.61 per cent area. The share of foodgrains was 91.55 per cent. Among foodgrains, total cereals occupied 68.89 per cent. Among cereals, wheat occupied 33.97 per cent and paddy 28.47 per cent. The major crops of the district were wheat, paddy, gram, jowar, linseed and soybean. The gross irrigated area of the district was 91.70 thousand hectares. Wheat was the most important irrigated crop occupied 84.06 per cent of the gross irrigated area. Wheat was the crop irrigated to the extent of 45.91 per cent.

3.3 Vidisha District (*For gram*)

For pulse crop (gram), Vidisha district was selected. The total geographical area of the district was 7,371 sq.km. It had 7 tehsils, 7 blocks, 549 village panchayats and 1,522 villages with a population of 1,214.86 thousands (Census 2001). Of the total population, male and female population formed 53.33 per cent and 46.67 per cent respectively. The percentage of rural and urban population were 78.57 and 21.43 per cent respectively. Scheduled castes and Scheduled tribes population formed 19.85 and 4.88 per cent of the total population. The remaining population belonged to "other" caste. The percentage of total workers to total population was 37.12. Cultivators, agricultural labourers and other workers formed 37.60, 37.09 and 22.96 per cent respectively of the total worker (4,50,975). The literacy percentage was 62.10. The literacy percentage in male, female, urban and rural population were 74.71, 47.45, 78.08 and 57.53 per cent respectively.

In Vidisha district, 1,22,593 land holders occupied an area of 5,39,562 hectares. The average size of holding was 4.40 hectares. Marginal and small holdings formed 42.82 per cent of the total number of holdings, but occupied only 9.78 per cent of the area. Big land holders (medium + large) formed 33.40 per cent of the total number of holding but commanded a comparatively larger percentage of area (74.73). Total geographical area of the district was 730.19 thousand hectares. Forest occupied 14.86 per cent area and net area sown was 74.22 per cent of the total geographical area. The gross cropped area of the district was 656.66 thousand hectares. Of the gross cropped area, rabi and kharif crops occupied 79.25 percent and 20.75 per cent respectively, and, food and non food crops occupied 81.49 per cent and 18.51 per cent respectively. The cropping intensity was 121.16 per cent.

Tube wells were the most important sources of irrigation commanded 33.78 per cent of the net irrigated area of 186.20 thousand hectares. Canal commanded 18.74 per cent followed by wells (15.09 per cent) and tanks (0.97 per cent). The irrigation intensity was 100 per cent. Of the total livestock (475.35 thousands), cattle formed 56.00 per cent, goat (21.39 per cent), buffaloes (19.87 per cent). Poultry birds also constituted significant (120.79 thousands) number in the district.

The cropping pattern of Vidisha district was rabi crop dominated covered 79.25 per cent of the gross cropped area. Food and non food crops covered 81.49 and 18.51 per cent respectively. Cereals and pulses (total foodgrains) dominated the cropping pattern occupied 80.37 per cent of the gross cropped area. Among pulses, gram occupied 30.79 per cent area of the gross cropped area. The cropping pattern of the district was food crops dominated. The most important irrigated crop of the district was wheat occupied 47.09 per cent of the irrigated area under all crops. Gram was another important irrigated crop occupied 45.85 per cent. Gram was irrigated to the extent of 42.24 per cent followed by wheat (37.65 per cent).

3.4 Selected tehsils/ blocks of Rewa District

For the study of wheat crop, four tehsils/ blocks of Rewa district namely Raipur Karchulian, Sirmour, Hanumana and Rewa having maximum area under wheat were selected. The cropping pattern of all the four selected blocks of Rewa district was food crop oriented. Food crop occupied more than 85 per cent area of the total cropped area. In all the blocks, the area under total cereal, was more than 60.00 per cent. Wheat was the major

cereal of Rewa district. It occupied more than 36 per cent area of the gross cropped area in all the blocks except Hanumana block, where wheat crop occupied nearly 30 per cent area.

The net irrigated area was highest in Rewa tehsil/ block followed by Sirmour (tehsil/ block), Raipur karchulian (tehsil/ block) and Hanumana (tehsil/ block). In Rewa tehsil/ block, tubewell was the major source of irrigation covered 64.65 per cent area of the net irrigated area. In Hanumana tehsil/ block, Canal was the major source of irrigatioin occupied 63.88 per cent area of the net irrigated area by all sources. In Sirmour tehsil/ block, major sources of irrigation were wells (27.15 per cent), followed by tubewells (26.43 per cent) and canals (18.63) per cent. In Raipur karchulian tehsil/ block, tubewell (62.11 per cent) was the main sources of irrigation followed by wells and other sources.

3.5 Selected tehsils/ block of Vidisha District

For the study of pulse crop (gram), four tehsils / blocks namely Basoda, Nateran, Kurwai and Sironj were selected from Vidisha district having maximum area under gram (pulse crop). Among four tehsils/ blocks, the gross cropped area was maximum in Basoda (114.55 thousand hectares) followed by Sironj (112.77 thousand hectares), Nateran (103.25 thousand hectares) and Kurwai (91.11 thousand hectares). The maximum cropping intensity was observed in Nateran (135.49 per cent) followed by Kurwai (127.44 per cent), Sironj (126.25 per cent) and Basoda (119.75 per cent). The maximum population was observed in Basoda followed by Sironj, Nateran and Kurwai. The density of population was highest in Basoda (198 person/ sq.km.) followed by kurwai (165), Sironj (154) and Nateran (145). In all the tehsils, the number of male population was more than the female population. All the tehsils/ blocks of Vidisha district were rural dominated. In all the four blocks the number of non working population was more than the working population.

The cropping pattern of all the selected blocks of the district was food crop oriented and rabi crops dominated. Among foodgrains, pulses occupied highest area in all the selected tehsils. Among pulses, gram occupied highest area in all the selected blocks. In all the tehsils/ blocks, gram occupied nearly 30 per cent of the gross cropped area.

4. Methodology

For this study, a three stage stratified random sampling design was used to select the block, village and farmers. The State of Madhya Pradesh was selected purposively. Out of 48 districts of the State, Rewa district was selected for cereals as the area under it was highest in this district. Vidisha district was selected for pulses as the area under it was highest in this district. From Rewa district one cereal crop (wheat) was selected for the study as this crop occupied highest area in cereal group. Similarly, from Vidisha district one pulse crop (Gram) was selected as it occupied highest area in pulse group. From each selected districts, four tehsils/ blocks were selected on the basis of highest area under respective crops. From each selected block, 5 villages were selected in consultation with Deputy Director of Agriculture of the concerned districts. From each selected village, a sample of 15 farmers (5 farmers from each size group i.e. small (0-2 ha.), medium (2.01 ha.- 4.00 ha.) and large group (above 4.00 ha.) were randomly selected from the referred list by adjusting the available size classes. In this way, a sample of 75 farmers from 5 villages were selected and a total of 300 farmers from 20 villages of 4 tehsils/ blocks were selected. In this way, a total of 600 farmers, comprising 300 farmers for wheat from Rewa district and 300 farmer for Gram from Vidisha district were selected (Table 1).

Table 1 Selected districts, tehsils / blocks and villages

District	Tehsils/ blocks	Name of villages
1. Rewa District Cereal (Wheat)	1. Raipur Karchulian	Etaura, Mahsua, Navagaon, Sonaura, Varrehi
	2. Hanumana	Alva khurd, Majhigawa, Masuriha, Nounkala, Salaiya
	3. Sirmour	Delahi, Gaura, Kanji, Karaudaha, Nakta,
	4. Rewa (Huzoor)	Azgarha, Khadda, Khaur, Kothi, Vasi
2. Vidisha District Pulse (Gram)	1. Basoda	Biladana, Gamakar, Mudara, Pachama, Rojaru
	2. Kurwai	Berkhedi, Chopra, Maliya Kheda, Parochha, Roshan Pipariya
	3. Nateran	Bamori, Hingoli, Jatpura, Mahoota, Pali
	4. Sironj	Khejra gopal, Kakarkhedi khurd, Manjoor Khedi, Sabdalpur, Siyalpur.

The reference year for the study was agricultural years 2004-05. Both primary and secondary data were collected. Primary data was collected from all the sample farmers by using a well designed pre- tested questionnaire by personal interview method.

Simple averages and percentages were used for the estimation of seed (used and kept for next year), feed (feed fed to bovines and poultry) and wastage ratios for food grain production at different stages.

5. Main Findings

The main finding for two selected crops i.e. wheat and gram are present\ed separately.

5.1 Wheat (Cereal) – District Rewa

1. The survey of wheat farmers covered 20 villages from 4 blocks of Rewa district. The total number of farmers in the 20 selected villages were 4,230. Of this, the highest number (3,066) of farmers belonged to small group followed by medium group (747) and large group (417).
2. The survey showed that the average number of family members per household was 7.29. In small size group it was 6.83, in medium group, 7.79 and in large size group, 7.26.
3. The overall average size of holding of the district was 3.20 hect. The average size of holding for small, medium and large farmers were 0.76 hectare, 2.61 hect. and 6.24 hectares respectively.
4. None of the selected farmers adopted the practice of leased in / leased out of land in Rewa district.
5. Among 300 households selected from Rewa district, 124 belonged to “OBC” group, 122 belonged to “Other” group and remaining 54 belonged to “Scheduled Caste” group. None of the sample farmers belonged to “Scheduled tribes” group.

6. The overall average size of holdings for the selected (300) farms was 3.45 hectares. For small size group, the average size of holding was 1.01 hectares followed by medium farms (3.06 hectares) and large farms (6.28 hect.)

7. Wheat was the major crop of Rewa district which occupied highest area in cropping pattern. The total area under wheat for all sample farmers was estimated at 599.99 hectare. Of this, nearly 60 per cent was grown as irrigated.

8. On sample farms, the area under wheat in all size group was highest. In small group, wheat occupied 42.48 per cent area of the gross cropped area. For medium and large farms, these figures were 31.94 per cent and 30.59 per cent respectively.

9. The production of wheat for total sample farmers was estimated at 15,19,550 Kg. Out of which, 4.96 per cent quantity of wheat was used as seed.

10. The overall productivity of wheat was 25.33 qt./ hect. In small group, the productivity of wheat was 23.76 qt./hact. It was 25.04 qt. /ha. in medium group and 25.83 qt./ha. in large size group. The productivity of wheat increases as the size of farm increases.

11. The total requirement of wheat for farm family consumption (retention for consumption at farmer's level) was estimated at 2,44,900 kg., which accounted for 16.1 per cent of the total production. The quantity of grains retained for consumption was 2449 Qtls. or 16.11 per cent of the total production of wheat.

12. The percentage of retention of wheat for consumption at farm level was highest (39.60 per cent) in small group and lowest (9.72 per cent) in large size group. It indicated that quantity of grains kept for home consumption decreases as the size of farm increases.

13. The estimates of retention of wheat for various purposes were as under

    a) Kept for seed purpose - 5.80 per cent
    b) Kind wages to labour - 4.14 per cent
    c) For animal feed - 3.43 per cent
    d) For poultry feed - 0.28 per cent

14. The total marketed surplus for wheat was estimated to be 57.64 per cent. In the case of small farms, the percentage of marketed surplus was 35.69 per cent. The marketed surplus increases as the size of farms increases. It was estimated at 51.88 per cent in medium farms and 64.96 per cent in large farms.

15. The survey showed that a total number of 1,759 livestock consumed 52,550 kg. of wheat as feed. The consumption of wheat grain per animal was estimated at 29.87 kg. The quantity of consumption of wheat as feed per animal was highest (60.16 kg.) in the case of buffaloe followed by cow (36.77 kg.) and bullock (26.63 kg.).

16. A total quantity of 4,300 kg. of wheat grains was consumed by 735 poultry birds. The consumption per bird was estimated at 5,850 gms. Consumption per bird (7,767 gms.) was highest in small farms and lowest (4,545gms.) in large farms.

17. The overall wastage of wheat production at different harvest and post harvest stages was estimated at 6.41 per cent. It was 8.17 per cent in the case of small farms, 6.84 per cent in medium farms and 5.88 per cent in large farms. The maximum losses of grains was occurred at the time of harvesting of crop (2.27 per cent) followed by storage losses (1.98 per cent) due to rat, moisture, insect pest etc. Nearly 0.35 per cent grain was wastage during transportation. The quantity of feed unconsumed by (animal and poultry) livestock was estimated at 0.22 per cent (Table 2).

Table 2 Wastage of Wheat (cereal) at different harvest and post harvest stages

Size of holding	Total production (Kg.)	Wastage (kg.)							
		Harvesting	Threshing and Shattered	Straw	Transportation	Storage	Home Consumption	Left for Animal/ Poultry Feed	Total wastage %
Small	1,86,650	4,285.00 (2.29)	1,878.00 (1.01)	381.70 (0.20)	631.50 (0.34)	5,817.00 (3.12)	1,585.00 (0.85)	668.00 (0.36)	8.17
Medium	4,39,300	9,940.00 (2.26)	4,455.00 (1.01)	909.00 (0.21)	1,539.00 (0.35)	10,033.00 (2.28)	1,947.00 0.44	1,293.00 (0.29)	6.84
Large	8,93,600	20,342.00 (2.28)	9,061.00 (1.01)	1,857.00 (0.21)	3,223.00 (0.36)	14,305.00 (1.60)	2,302.00 (0.26)	1,423.00 (0.16)	5.88
All	15,19,550	34,567.00 (2.27)	15,394.00 (1.01)	3,147.70 (0.20)	5,393.50 (0.35)	30,155.00 (1.98)	5,834.00 (0.38)	3,384.00 (0.22)	6.41

Note : Figures in brackets denote percentage to total production

The survey showed that the storage losses was highest (3.12 per cent) on small farms, followed by medium farms (2.28 per cent) and large farms (1.60 per cent). Wastage during home consumption was estimated at 0.85 per cent in the case of small farms followed by medium farms (0.44 per cent) and large farms (0.26 per cent).

18. The consumption of wheat as seed, feed and wastage was estimated at 18.96 per cent on small farms, 16.94 per cent on medium farms and 13.45 per cent on large farms. The survey showed that the consumption of wheat grains as seed, feed and wastage decreases as the size of holding decreases. As the size of farms increases, the percentage of wastage decreases (Table 3).

Table 3 Percentage of seed, feed and wastage in production of cereals (wheat), Rewa District.

Size of Holding	Area (ha.)	Production (Kg.)	Seed used		Seed kept		Used as feed		Wastage		Consumption as seed, feed and wastage	
			Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)
Small	78.56	186650	9589	5.14	10050	5.38	10550	5.65	15245	8.17	35384	18.96
Medium	175.46	439300	21704	4.94	27700	6.30	22600	5.14	30116	6.86	74420	16.94
Large	345.97	893600	44075	4.93	50300	5.63	23600	2.64	52513	5.88	120188	13.45
All	599.99	1519550	75368	4.96	88050	5.79	56750	3.73	97875	6.44	229993	15.13

5.2 Gram (Pulses) – District Vidisha

1. The survey of Gram farmers covered 20 villages from 4 blocks of Vidisha district. The total numbers of farmers in 20 selected villages were 3007. Of this the highest number (1,875) of farmers belonged to small group followed by medium group (620) and large group (512).

2. The survey showed that the average number of family members per household was 6.44. For small size group it was 5.47. For medium and large size group the numbers of family members per household were 6.83 and 7.02 respectively. It showed that the number of family member per household increases as the size of holding increases.

3. The overall average size of holding of Vidisha District was 3.47 Hectares. In the case of small, medium and large farmers, the average size of holdings were 1.01 hect., 2.88 hect. and 6.52 hect. respectively.

4. In Vidisha district, not a single farmer adopted the practice of leased in / leased out of land.

5. From 300 households selected for gram in Vidisha district, 209 farmers belonged to "Others" group, 66 farmers belonged to "OBC" group and remaining 25 farmers belonged to "Scheduled Caste" group. None of sample farmers belonged to "Scheduled Tribes" group.

6. The overall average size of holdings for the 300 selected farmers was 3.79 hectares. In the case of small size group, the average size of holding was 0.99 hectares followed by medium farms, 2.95 hectares and large farms, 7.42 hectares.

7. Gram was the major pulse crop of Vidisha district covered (26.72 per cent) highest area in cropping pattern. The total area under gram for all the sample farmers was estimated at 514.58 hectares. Of this area, about 61 per cent was grown as irrigated.

8. On sample farms, the area under gram was highest in all size groups. It occupied 36.74 per cent area of the gross cropped area in the case of small size farms. For medium and large size farms, these figures were 27.83 per cent and 24.85 per cent respectively.

9. The total production of gram on sample farms was estimated at 5,96,300 kg. Out of which, 6.97 per cent of total production of gram was used as seed. The quantity kept as seed for next year's production was 10.21 per cent.

10. The overall productivity of gram was 11.59 qt./ ha. In small group, the productivity of gram was 12.49 qt./ ha. It was 11.37 qt./ ha. in medium size group and 11.51 qt./ha. in large size group. The survey showed that the productivity of gram increases as the size of farms increases.

11. The total requirement of gram for farm family consumption (retention for consumption at farmer's level) was estimated at 49,735 kg., which accounted for

8.34 per cent of the total production of gram. The quantity of gram retain for consumption was 49,735 kg.

12 The percentage of retention of gram for consumption at farm level was highest (13.98 per cent) in small farms and lowest (5.86 per cent) on large farms. It showed that the quantity of gram kept for home consumption decreases as the size of farm increases.

13 The estimates of retention of gram for various purposes were as under

(a) kept for seed purpose	-	10.21 per cent
(b) Kind wages to labour	-	3.39 per cent
(c) For animal feed	-	4.91 per cent
(d) For poultry feed	-	0.96 per cent

14. The total marketed surplus for gram was estimated to be 59.03 per cent. In the case of small farms, the percentage of marketed surplus was 57.32 per cent, followed by medium farms (58.57 per cent) and large farms (59.63 per cent). The marketed surplus increases as the size of farms increases.

15 The findings of the study showed that a total number of 1,796 livestock consumed 29,400 kg. of gram as feed. The consumption of gram per animal was estimated at 16.37 kg. The quantity of gram as feed per animal was highest (35.42 kg.) in the case of buffaloe followed by cow (28.31 kg.) and bullock (21.08 kg.)

16. A total quantity of 5,810 kg of gram was consumed by 1,334 poultry birds. The consumption per bird was estimated at 4,355.32 gms. The consumption of gram per bird was highest (5,122.95 gms) on medium farms and lowest (4,161.16 gms) on large farms.

17. The overall wastage of gram production at different harvest and post harvest stages was estimated at 6.45 per cent. It was highest (7.14 per cent) on small farms and lowest (6.31 per cent) on large farms.

18. The maximum loss of gram was occured at the time of harvesting of crop (2.37 per cent) followed by storage losses (1.81 per cent) due to rat and insect-pest. Nearly 0.92 per cent wastage was observed at the time of threshing and shattered on ground. About 0.22 per cent produce was left in straw. During animal feed, 0.30 per cent losses was observed. During home consumption, 0.55 per cent produce was lost. In

the case of storage, the highest loss of gram was observed on small farms followed by medium and large farms. During home consumption, the maximum loss was observed on large farms followed by small farms and medium farms (Table 4).

Table 4 Wastage of Gram (Pulse) at different harvest and post harvest stages

Size of holding	Total production (Kg.)	Quantity (kg.) for							
		Harvesting	Threshing and Shattered	Straw	Transportation	Storage	Home Consumption	Left for Animal/ Poultry Feed	Total wastage %
Small	78,300	1,998 (2.55)	785 (1.00)	184 (0.23)	289 (0.37)	1,680 (2.15)	415 (0.53)	240 (0.31)	7.14
Medium	1,67,400	4,013 (2.40)	1,596 (0.95)	349 (0.21)	462 (0.28)	3,034 (1.81)	770 (0.46)	550 (0.33)	6.44
Large	3,50,600	8,117 (2.32)	3,135 (0.89)	751 (0.21)	908 (0.26)	6,107 (1.74)	2101 (0.60)	1,005 (0.29)	6.31
All	5,96,300	14,128 (2.37)	5,516 (0.92)	1,284 (0.22)	1,657 (0.28)	10,821 (1.81)	3,285.50 (0.55)	1,795 (0.30)	6.45

Note : Figures in brackets denote percentage to total production

19. The consumption of gram as seed, feed and wastage was estimated at 19.06 per cent on large farms, 19.62 per cent on medium farms and 19.74 per cent on small farms. The total wastage of gram on small farms was estimated at 7.14 per cent followed by medium farms (6.44 per cent) and on large farms (6.31 per cent) (Table 5).

Table 5 Percentage of seed, feed and wastage in production of pulses (gram)

Size of Holding	**Area (ha.)**	**Production (Kg.)**	**Seed used**		**Seed kept**		**Used as feed**		**Wastage**		**Consumption as seed, feed and wastage**	
			Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)
Small	62.69	78300	5253	6.71	6640	8.48	4610	5.89	5590	7.14	15453.00	19.74
Medium	147.20	167400	11879	7.10	17150	10.24	10175	6.08	10773.50	6.44	32827.50	19.62
Large	304.69	350600	24425	6.97	37100	10.58	20250	5.78	22123	6.31	66798.00	19.06
All	514.58	596300	41557	6.97	60890	10.21	35035	5.87	38486.50	6.45	115078.50	19.29

5.3 Foodgrains (wheat + gram)

1. In the case of wheat, the total gross value of crop output was Rs.1,10,16,738 and in the case of gram, it was Rs. 84,97,275. The total gross value of these two crops was estimated at Rs. 1,95,14,013 .

2. The survey showed that the overall availability of wheat for human consumption was 84.87 per cent of the total production. On small, medium and large size farms, the availability of wheat for human consumption was 81.04 per cent, 83.06 per cent and 86.55 per cent respectively.

3. The overall availability of gram for human consumption was 80.71 per cent of the total production. It was more or less same in all the size group i.e. about 80 per cent.

4. Of the total production of foodgrains (wheat + gram), the consumption of production as seed, feed and wastage was observed, 16.31 per cent and the availability of foodgrains (wheat + gram) for human consumption was 83.69 per cent of the total production (Table 6).

Table 6 Crop wise percentage of seed, feed and wastage in production of wheat and gram

Crop	Area (ha.)	Production (Kg.)	(1)		(2)		(3)		(4)		(1+3+4)	
			Seed used		Seed kept		Used as feed		Wastage		Consumption as seed, feed and wastage	
			Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)	Qty. (Kg.)	(%)
Wheat	599.99	1519550	75368	4.96	88050	5.79	56750	3.73	97875	6.44	229993	15.13
Gram	514.58	596300	41557	6.97	60890	10.21	35035	5.87	38486.50	6.45	115078.50	19.29

Table 7 Net availability of foodgrains (wheat + gram) for human consumption

Crop	Total Area (ha.)	Total Production (Kg.)	Consumption of Production as Seed, Feed and Wastage (kg.)	Availability of wheat and gram for human consumption (Kg.)	Net availability of wheat and gram for human consumption (Kg.)
Wheat	599.00	15,19,550 (100.00)	2,29,993 (15.13)	12,89,557 (84.87)	589.38
Gram	514.58	5,96,300 (100.00)	1,15,078 (19.29)	4,81,221.50 (80.71)	249.08
All (Food grain)	1114.57	21,15,850	3,45,071 (16.31)	17,70,778.50 (83.69)	429.80

Note : Figures in brackets denotes percentage to total production

5. The finding showed that the net availability of wheat, gram and foodgrain (wheat + gram) for human consumption came to 589.38 kg., 249.08 kg. and 429.80 kg. respectively (Table 7).

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