ASSESSMENT OF MARKETABLE & MARKETED SURPLUS OF WHEAT, GRAM & TUR IN MADHYA PRADESH

AGRO- ECONOMIC RESEARCH CENTRE FOR MADHYA PRADESH AND CHHATTISGARH
Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.)

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PREFACE

The present study entitled **"Assessment of marketable and marketed surplus of wheat, gram & tur in Madhya Pradesh***" has been assigned by the Directorate of Economics and Statistics Ministry of Agriculture Government of India to this centre under the close coordination of Centre for Management in Agriculture, Indian Institute of Management, Ahmadabad.*

The study comprises of 100 wheat growers, 100 gram growers and 100 tur growers of Hoshangabad, Vidisha and Narshingpur districts of M.P. An average HH was found to be sold their 82.56 per cent (wheat), 88.43 per cent (gram) and 93.14 per cent (tur) of the total production in the market. The maximum of quantity of grains were sold in the month of March and April just after the harvest of the crop. It is also observed from the data that more than 90 per cent of total marketed surplus has been sold in regulated market/cooperative society and remaining 10 per cent found to be sold to private traders or to agricultural/professional money lenders present in the villages. As the size of holding increased the marketed surplus sold to govt. agencies has been found to be increased, while decreases when sold to private trader/money lender.

The present study was conducted by Dr. H.O. Sharma, Dr. Deepak Rathi and Mr. S.C. Meena of this Centre. They have done field investigation, tabulation and analysis, and interpretation and drafting of the report. I wish to express my deep sense of gratitude to them and their team members namely; Mr. Shrikant Upadhye, Mr. C.K. Mishra, Mr. Arvind Dangi, Mr. Dushyant Kumar and Mr. Ravi Singh Chouhan for their untiring efforts in bringing this innovative study to its perfect shape.

I extend my heartfelt thanks to the Coordinator of this study Dr. Vijay Paul Sharma Professor, Centre for Management in Agriculture, Indian Institute of Management, Ahmadabad 380 015 (India) for providing necessary guidelines and time to time suggestions for conducting the study.

On behalf of the Centre, I express my deep sense of gratitude to Dr. V.S. Tomar, Hon'ble Vice-Chancellor, & chairman advisory committee of AER centre, Dr. S.S. Tomar, Director Research Services, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur for providing valuable guidance, constant inspiration and all the facilities during various stages in successful completion of this study of high importance.

I express my sincere thanks to the Director, Department of Farmers Welfare and Agricultural Development, Bhopal Madhya Pradesh, Deputy Directors of the Districts viz. Hosangabad, Vidisha, Ujjain and Raisen, and their field staff for providing not only secondary data but also extending help in collection of field data from the selected respondents.

I hope the findings and suggestions made in the study would be useful to policy makers of the states and Govt. of India

Date : 14.01.2014   **(N.K. Raghuwanshi)**
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CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

This chapter deals with the macro over-view of Madhya Pradesh Agriculture, concept of marketable and marketed surplus, relevance, objectives and review of literature related to the study with the organization of the report in different chapters.

1.1 Macro Over view of Madhya Pradesh Agriculture

Madhya Pradesh is located in Central India. The state is bound in the North by Uttar Pradesh, the East by Chhattisgarh, the South by Maharashtra and the West by Gujarat and Rajasthan. The most commonly spoken language of the state is Hindi. English and Marathi are the other languages used. Bhopal (The capital) Indore, Gwalior, Jabalpur and Ujjain are some of the key cities of the state. There are 11 agro-climatic zones and variety of soils available in the state to support cultivation of wide range of crops. Madhya Pradesh got an honour of the best agriculture state of the India in the year 2013 for highest agriculture growth of 18 per cent. Madhya Pradesh also stood in top most position in India for producing pulses and oilseeds in the year 2013 and also for record production and procurement of wheat at minimum support price (MSP) in the year 2011 – 12. State also got Krishi Karmath Award of 2012 for development and extension of newer modern technology of agriculture. The state is a leading producer of garlic and coriander.

Table 1.1: Madhya Pradesh at a glance

Particulars	Madhya Pradesh
Capital	Bhopal
Geographical area (sq km)	307.55
Administrative districts (No)	50
Population density (persons per sq km)*	236
Total population (million)*	72.5
Male population (million)*	37.6
Female population (million)*	34.9
Sex ratio (females per 1,000 males)*	930
Literacy rate (%)*	70.6

Sources: Government of Madhya Pradesh Website, www.mp.gov.in, *Provisional Data – Census 2011

Around 31 per cent of land of the state is under forest cover with abundant natural resources. Favorable soil and climatic conditions have helped the state to be a leading producer of coarse cereals, oilseeds and soybean in the country. Madhya Pradesh has rich mineral resources and has the largest reserves of diamond and copper in India. Besides, the state has

significant reserves of coal, coal-bed methane, manganese and dolomite. The state is a manufacturing base for a number of large and medium scale industries from diverse sectors such as automobile and auto-components, cement, agro-processing, consumer goods, pharmaceuticals, etc. It also has a large pool of industrial labour. Because of its forest cover, the state has immense potential for tourism, particularly wild-life and adventure and eco-tourism. It also has globally renowned locations of historical and religious significance. The state attracts large number of domestic and international tourists.

At current prices, the Gross State Domestic Product (GSDP) of Madhya Pradesh for 2010-11 was US$ 57.0 billion. Between 2004-05 and 2010-11, the average annual GSDP growth rate was 14.6 per cent. (Fig 1.1)
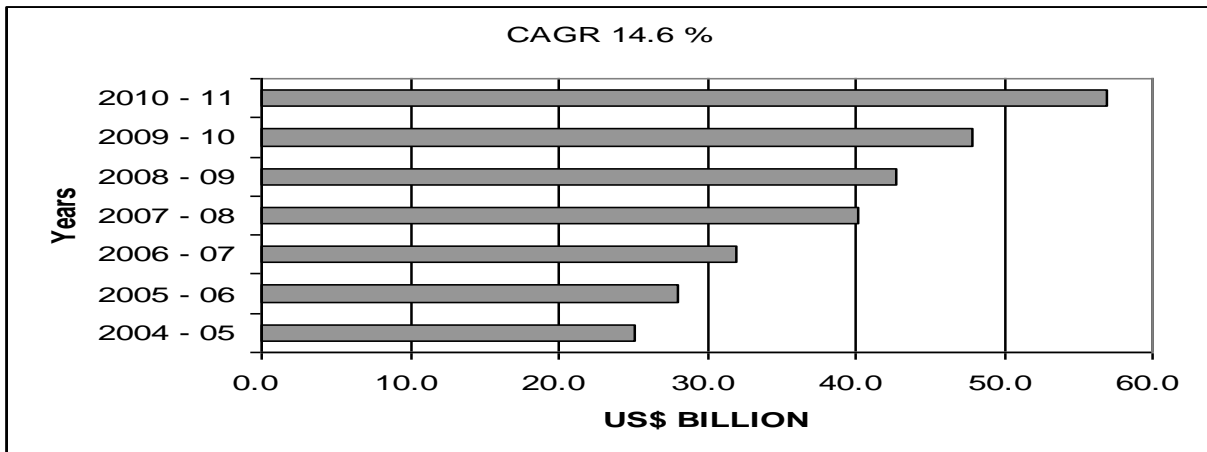
Fig 1.1 Gross state Domestic product of Madhya Pradesh

The Net State Domestic Product (NSDP) of Madhya Pradesh was about US$ 50.7 billion in 2010-11. The average NSDP growth rate between 2004-05 and 2010-11, was about 14.7 per cent. (Fig. 1.2)
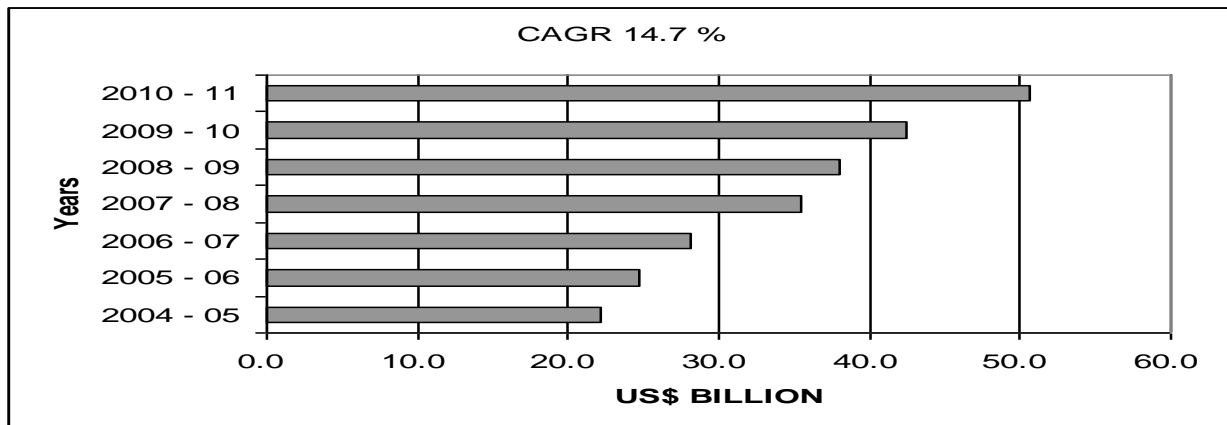
Fig 1.2 Net State Domestic product of Madhya Pradesh

The state's per capita GSDP in 2010-11 was US$ 795.1 as compared to US$ 388.1 in 2004-05. Per capita GSDP has increased at a CAGR (Compound Annual Growth Rate) of 12.7 per cent between 2004-05 and 2010-11 (Fig. 1.3).
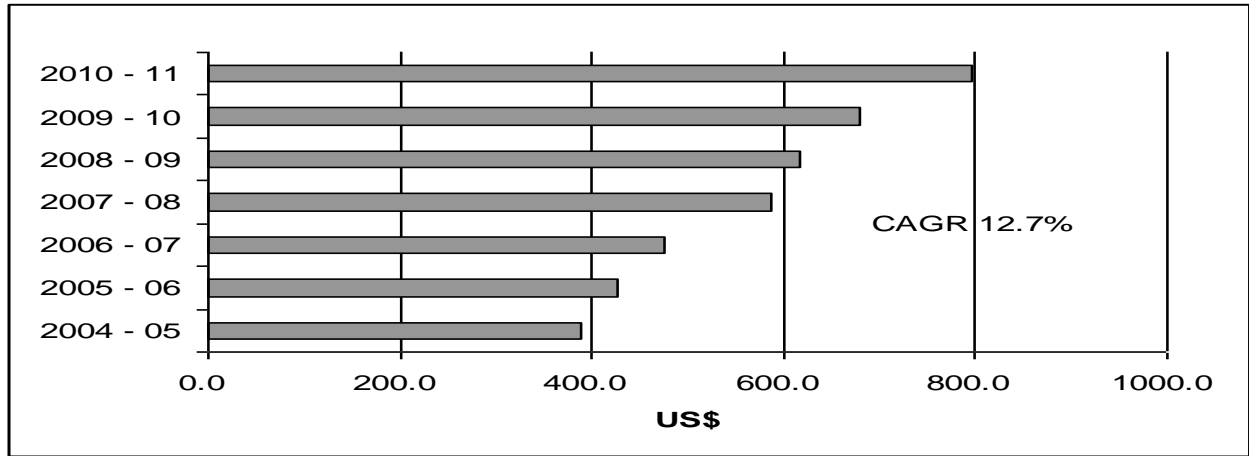
Fig 1.3: State's Per Capita GSDP

The state's per capita NSDP in 2010-11 was US$ 707.0 as compared to US$ 343.5 in 2004-05. The per capita NSDP increased at an average rate of 12.7 per cent between 2004-05 and 2010-11(Fig. 1.4).
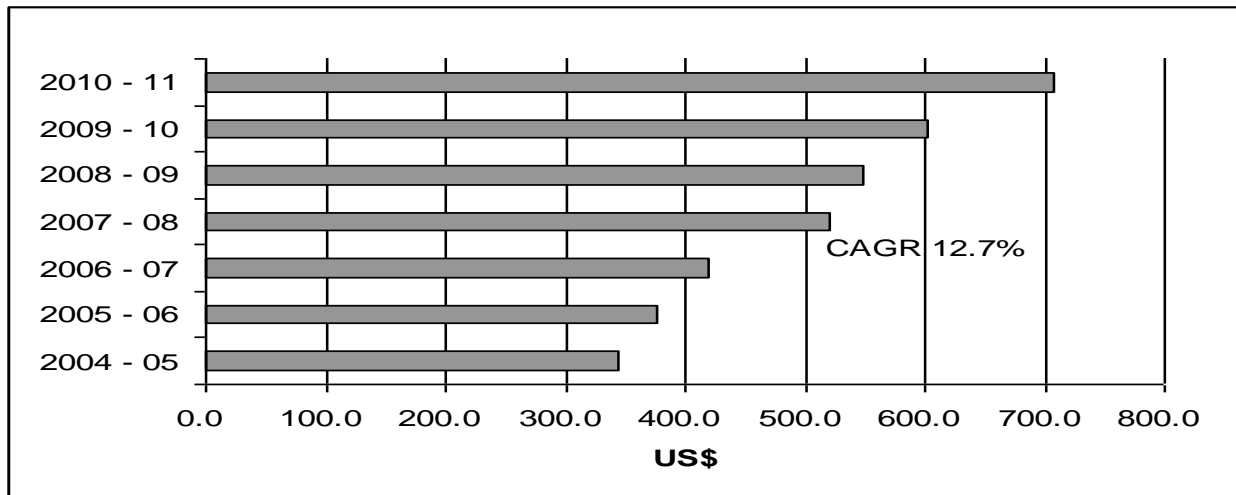
Fig 1.4: State's Per Capita NSDP

In 2010-11, the tertiary sector contributed 46.0 per cent to the state's GSDP at current prices, followed by primary sector (28.5 per cent) and secondary sector (22.5 per cent). At a CAGR of 17.4 per cent, the secondary sector has been the fastest growing among the three sectors from 2004-05 to 2010-11. It was driven by manufacturing, construction and electricity,

gas & water supply. The tertiary sector grew at a CAGR of 15.2 per cent between 2004-05 and 2010-11. The growth has been driven by trade, hotels, real estate, finance, insurance, transport, communications and other services. The primary sector grew at a CAGR of 12.4 per cent between 2004-05 and 2010-11.
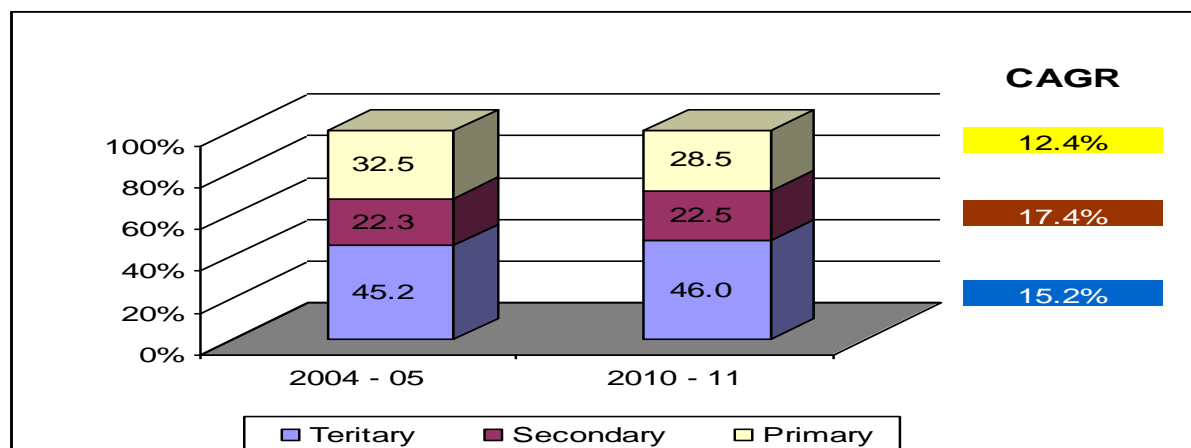
Fig 1.5 Contribution of different sector in GSDP at current prices

Table 1.2: General information of Madhya Pradesh

Parameter	Madhya Pradesh	All-States	Source
Economy			
GSDP as a percentage of all states' GSDP	3.8	100	CMIE, 2010-11, current prices
Average GSDP growth rate (%)*	14.9	15.9	CMIE, 2004-05 to 2010-11, current prices
Per capita GSDP (US$)	795.1	1,324.3	CMIE, 2010-11, current prices
Physical Infrastructure			
Installed power capacity (MW)	8,779.9	199,627.0	Central Electricity Authority, as of March 2012
Wireless subscribers (No)	50,873,737^	903,727,208	Telecom Regulatory Authority of India, as of January 2012
Broadband subscribers (No)	414,100	13,350,938	Ministry of Communications & Information Technology, as of December 2011
National Highway length (km)	5,027	71,772	Ministry of Road Transport & Highways, Annual Report 2011-12
Airports (No)	5	133	Airport Authority of India
Social Indicators			
Literacy rate (%)	70.6	74.0	Provisional Data – Census 2011
Birth rate (per 1,000 population)	27.3	22.1	SRS Bulletin (www.censusindia.gov.in), 2011
Investment			
FDI equity inflows (US$ billions)	0.7*	160.0	Department of Industrial Policy & Promotion, April 2000 to January 2012
Outstanding Investments (US$ billions)	461.3	11,318.3	CMIE (2011-12)
Industrial Infrastructure			
PPP projects (No)	88	881	www.pppindiadatabase.com
SEZs (No)	6	386	Notified as of July 2012, www.sezindia.nic.in

*Including Chhattisgarh PPP: Public Private Partnership, SEZ: Special Economic Zone, SRS: Sample Registration System , *In Indian Rupee Terms ^Including Chhattisgarh

The Physiography of the state exhibits a great deal of diversity with areas ranging from less than 50 meter above mean sea level to more than 1200 meter. The state falls under the catchments of Yamuna, Ganga, Narmada, Mahanadi and Godavari. On the basis of broad land features and different soil and rain fall pattern, the state was classified in 5 physiographic regions and 11 agro-climatic zones (Fig. 1.6 & Table 1.3)

1. Northern low lying plains comprising Gwalior, Bhind and Morena districts and extended to Bundelkhand up to the west of Panna range and excludes certain parts of Rewa district between Panna and Kaymore hills of Baghelkhand.

2. The Malwa and Vindhyan Plateau comprises of Vidisha, Shivpuri, Datia, Guna, Ujjain and Mandsour districts and parts of Sehore, Raisen and Dewas districts. It consists of large undulating plains of black cotton soil dotted with flat-topped hills. It has also hilly Vindhyan Plateau situated it the north of Narmada Valley and to the south of the low-lying regions of Bundelkhand and Baghelkhand. It separated from east of Malwa plateau to Maikal and Dorea hills of Satpura range.
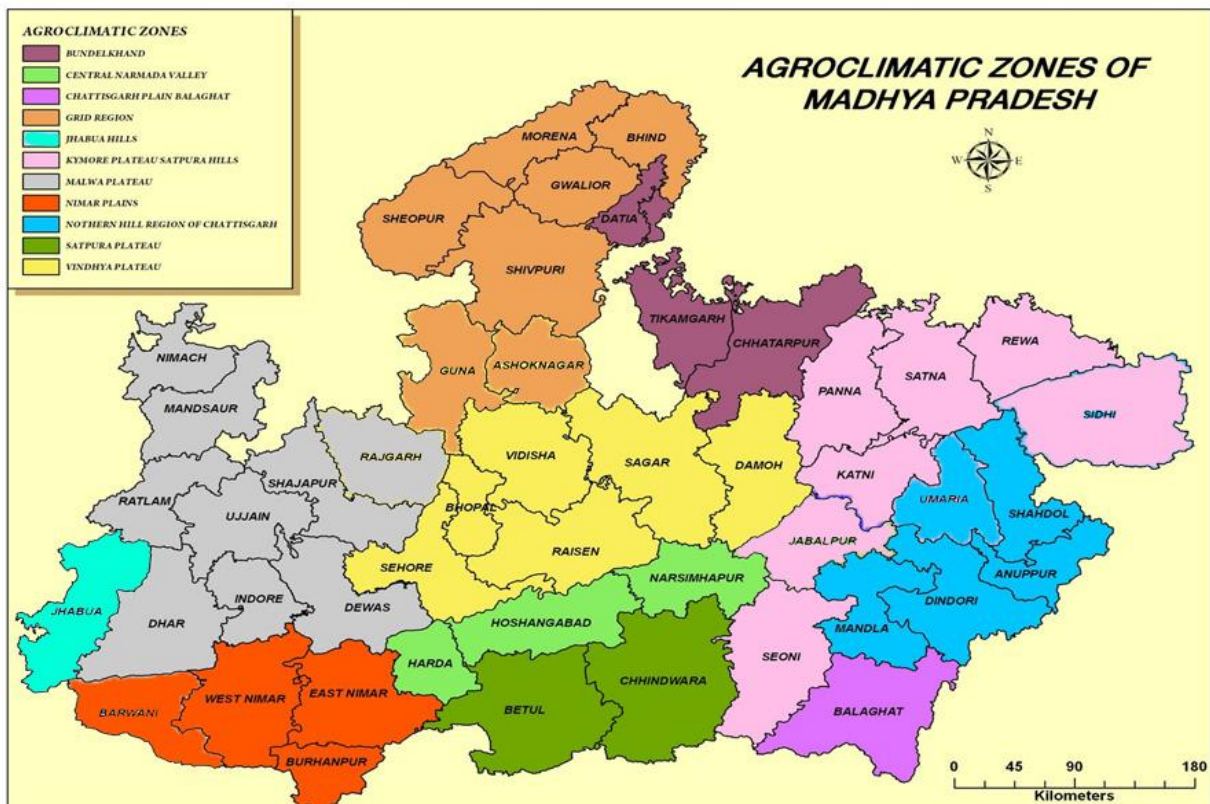
Fig. 1.6: Agro-Climatic Zones of Madhya Pradesh

3. The Narmada Valley stretching from Jabalpur in the east up to Barwani district in the west. It is nearly 560 Km long and 48 Km wide and is walled on the north by the Vindhyan range and on the south by Satpura range. It covers the districts of Jabalpur, Nasinghpur, Hoshangabad, Khandwa, Khargone, Barwani, Dhar, and some parts of Raisen, Sehore, and Dewas districts.

Table-1.3: Agro-Climatic Regions and covered Districts /Tehsils in Madhya Pradesh

(Area in Lakh ha)

Agro-Climatic Regions	Districts /Tehsils	Geographical Area	Percent to Geographical Area
1. Malwa Plateau	Indore, Dhar, (Dhar, Badnawar, Sardarpur tehsils) Shajapur, Mandsour, Nimuch, Ratlam, Ujjain, Dewas Rajgarh districts and Petlawad tehsil of Jhabua district	51.47	16.74
2.Vindhyan Plateau	Bhopal, Vidisha, Sehore (Sehore, Ashta, Ichhawar, Narsullaganj tehsils) Raisen (Raisen, Gairatganj, Begamganj, Silwani, Goharganj, Udaipura tehsils), Damoh, Guna (Chachora & Raghogarh tehsils) & Sagar districts	42.59	13.85
3.Central Narmada Valley	Hoshangabad (Seoni-Malwa, Hoshangabad, Sohagpur tehsils), Harda, Nasinghpur districts, Budhani and Barelli tehsil of Sehore and Raisen districts respectively	17.45	5.67
4.Satpura Plateau	Betul, Chhindwara districts	21.93	7.13
5.Jhabua Hills	Jhabua, Jobat, Alirajpur tehsils of Jhabua district & kukshi tehsil of Dhar district	6.88	2.24
6.Gird Region	Gwalior, Bhind, Morena, Shivpur-Kalan, Guna (Mungawali and Ashoknagar tehsils), Shivpuri (Shivpuri, Kalaras, Pohari tehsils)	31.85	10.36
7. Kymore Plateau	Jabalpur, Katni, Rewa, Panna, Satana, Sidhi, Seoni and Gopadbanas & Deosar tehsils of Sidhi district.	49.97	16.25
8.Bundel Khand Region	Tikamgarh, Chhatarpur, Datia districts, Karela, Pachore tehsil of Shivpuri and Guna tehsil of Guna district	22.82	7.42
9.Nimar Valley	Khandwa, Khargone, Barwani district, Manawar tehsil of Dhar district and Harda district	25.17	8.18
10.Northern Hills of Chhattisgarh	Shahdol, Umariya Mandla, Dindori district & Singrauli tehsil of Sidhi district	28.17	9.16
11.Chhattisgarh plain	Balaghat district	9.25	3.00
Madhya Pradesh		**307.55**	**100.00**

4. The Satpura range runs from west to east for about 640 Km through Khandwa, Betul, Chhindwara, Seoni, Mandla districts. Its northern spurs go into Hoshangabad and Nasinghpur districts and in the south an extensive spur of 160 Km covers entire Balaghat districts.

5. Madhya Pradesh also covers Balaghat and Shahdol districts of Chhattisgarh Plains and Northern Hills of Chhattisgarh zone respectively. The state is bordered on the west by Gujarat,

on the northwest by Rajasthan, on the northeast by Uttar Pradesh, on the east by Chhattisgarh, and on the south by Maharashtra.

The main soil types found in Madhya Pradesh are alluvial, deep black, medium black, shallow black, mixed red and black, mixed red and yellow and skeletal soils. (Table 1.4)

Table 1.4: Soil types and districts covered in Madhya Pradesh.

Types of Soil	Districts covered
Alluvial Soil	Bhind, Morena and Gwalior
Deep Black Soil	Hoshangabad and Nasinghpur
Medium Black Soil	Jabalpur, Sagar, Vidisha, Sehore, Damoh, Guna, Bhopal, Raisen, Rajgarh, Indore, Dewas, Ujjain, Mandsour, Shajapur, Ratlam, Dhar, Khargone and Khandwa
Shallow Black Soil	Betul, Chhindwara and Seoni
Red & Black Soil	Shivpuri, Rewa, Satna, Panna, Sidhi, Chhaterpur, Tikamgarh, Datia and some parts of Guna district.
Red & Yellow Soil	Balaghat.
Gravelly Soil	Mandla.

The climate of Madhya Pradesh by virtue of its location is predominately moist sub humid to dry sub humid, semi arid to dry sub-humid and semi arid in east, west and central plateau and hills respectively, according to agro-climatic regions of India. The seasons in Madhya Pradesh are as given below (Table 1.5)

Table 1.5: Seasons and their periods in Madhya Pradesh

Seasons	Period	
	From	To
Rainy	June	September
Post Monsoon	October	November
Winter	December	February
Summer	March	May

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

The maximum temperature during extreme summer reaches as high as 47^0C and the minimum during winter dips up to 0^0C. The maximum normal temperature varies between 25 and 35^0C and minimum normal between 10^0 to 20^0C.The relative humidity ranges from 40 to 70 per cent throughout the year.

Wheat, soybean, gram, sugarcane, rice, maize, cotton, rapeseed & mustard and Arhar are the major crops of the state in 2010-11. Total food grain production of the state was around 17.6 million tones in 2010-11. Total oilseeds and total pulses production of the state was around 8035.4 and 3386.10 thousand tonnes, respectively (Table 1.6).

Table 1.6: Production of major crop products (000' t)

Crop	Annual Production – 2010-11**
Wheat	9,046.0
Soybean	6,669.0
Gram	2,686.0
Sugarcane^	2,540.0
Paddy (Rice)	1,772.0
Maize	1,315.0
Cotton^	860*
Rapeseed and Mustard	855.0
Arhar	164.0
Total Oilseeds	8,035.4
Total Pulses	3,386.1

Sources: Economic Survey of Madhya Pradesh 2011-12, Department of Agriculture and Cooperation, Government of India, * '000 Bales (170 kgs each) ^As of 2009-10 **Estimated

In 2009-10, Madhya Pradesh was the largest producer of pulses, oilseeds and soybean in the country.

1.2 Concept of Marketable and Marketed Surpluses

Marketable Surplus is a theoretical ex ante concept which represents the surplus which the farmer/producer has available with himself for disposal once the genuine requirements of the farmer for family consumption, payment of wages in kind, feed, seed, wastage and purchases have been met. Marketed Surplus as compared to marketable surplus is a practical ex post concept and refers to that part of the marketable surplus which is marketed by the producer i.e. not only the part which is available for disposal but that part which is made available to the market or to the disposal of the non-farm rural and urban population.

1.2.1: Computation of Marketable Surplus

It is computed by the formula: A − B = MS

Where MS is Marketable Surplus, A - stands for net availability of the given crop in the year of reference and B - stands for the following items in the same year :

  i.   Consumption by the farm family,

ii. Consumption by permanent labour engaged on the farm,

iii. Consumption by the temporary labour occasionally employed on the farm,

iv. Quantity retained for seed,

v.   Quantity retained as feed for farm animals,

vi. Quantity retained for barter,

vii. Payments in kind :

     a) To permanent labour,

     b) To temporary labour,

     c) For machinery and equipment,

     d) For customary payments,

     e) To land owners as rent,

     f) To land owners as share of produce,

     g) for re-payment of loan,

     h) Land revenue,

     i) Irrigation charges and

     j) Others.

viii. Physical losses:

     a) In threshing and winnowing

     b) In transport from threshing floor to storage, and

     c) In storage at producer's level.

1.2.2 Consumption by the farm family

The term "Consumption by the farm family" of the cultivator households has two distinct connotations in so far as its impact on marketed and marketable surplus is concerned. For marketed surplus, it refers to the quantity actually retained for consumption by the family irrespective of the actual total requirements for the purpose. For Marketable Surplus it refers to the quantity that ought to be retained by the farm family for its consumption or the quantity required for consumption.

In case of marginal and small farmers the quantity actually retained is usually less than the quantity actually required for consumption owing to the compulsions or constraints of the size of holding and production. They are, therefore, required to buy back quantities by which

they fall short of their consumption requirements. They may make up the deficit with the help of borrowings, wages or gifts etc. In any case they buy back some quantities from the total stocks, which move out of the farm. The term family consumption, in case of such farmers, therefore, denotes the quantity that ought to be retained by a farm family for its consumption requirements for the whole year.

The use of the term "Surplus" would thus be justified only if the quantity actually required for consumption, rather than the quantity actually retained for consumption is taken into account for arriving at the quantity of marketable surplus actually available for non farm consumption.

In case the quantity actually retained for consumption (and not the quantity actually required for consumption) is taken into account, the quantity calculated is the marketed surplus which is a gross concept not subtracting repurchases[1], because the quantity sold will not include the buy backs by the producers. Meanwhile, instead of quantity retained for family consumption, the quantity required for consumption is taken into consideration for calculation of marketable surplus and hence it is a net concept subtracting repurchases.[2] The quantity required for family consumption has been calculated by adding the "Quantity retained for family consumption + Quantity purchased for family consumption + Total receipts in kind for family consumption".

The marketable surplus will thus be according to the formula:

$A - B = MS$

Where, A stands for production, and B includes all the items mentioned earlier except that

"Quantity required for consumption" has been treated to include the quantity required for "family consumption" as explained above and MS stands for "marketable surplus". This quantity is actually available for non-farm consumption and is, therefore, true Marketable Surplus.

1.2.3: Computation of marketed surplus

In case the quantity actually retained for consumption (and not the quantity actually required for consumption) is taken into account, the quantity calculated is the marketed surplus

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[1] Mark D Newman, Michigan State University Research Monograph, 1977, page 7,8..
[2] ibid

which is a gross concept, because the quantity sold will not include the buy backs by the producers. The marketable surplus will thus be according to the formula:

A – B = MS

Where A stands for production and B includes all the items mentioned above apart from viii) (c) ie viii) Physical losses: c) In storage at producer's level.

The term "Consumption by the farm family" of the cultivator households refers to the quantity actually retained for consumption by the family irrespective of the actual total requirements for the purpose.

For Accounting Purpose:

Marketable Surplus=Net availability of the Crop in the year-Retention including all seed feed and wastage – Purchases.

Marketed Surplus= Net availability of the Crop in the year-Retention included seed, feed and wastage losses apart from losses at producer level. (Also, Repurchases are not included.)

The marketable surplus differs from region to region and within the same region, from crop to crop. It also varies from farm to farm. On a particular farm, the quantity of marketable surplus depends on 1). Size of operational holding, 2). Yield of Commodity, 3). Price of the Commodity, 4). Household Size, 5). Requirements of seeds and feed, 6). Payments to labor in kind, 7) Distance from mandi, and 8) stock of previous year etc.

The larger the quantity actually marketed, greater the cash income to a farmer. Accordingly, crops also came to be known as cash crops, which earn more cash income to the farmers. The marketable or marketed surpluses depend upon type of crop i.e. foodgrain, other food crop or non-food crop. In the case of foodgrain and other food crops, the surpluses are generally less on small and marginal farms and their proportions a widely according to the size of holding and other related factors. But in the case of non-food crops viz. Cotton, sugarcane, soybean etc. which is used as raw material in agro-based industry, almost all the production is available for sale except small quantities kept for seed. In these crops, marketable surpluses are nearly 100 per cent. Such crops are called as cash crops or commercial crops. On the same analogy, even food crops with large marketable surpluses (say above 50%) can be regarded as cash or commercial crops. As a result of the development of these two concepts, the studies

regarding marketable and marketed surpluses have aroused interest in the minds of researchers in Agricultural Marketing with a view to identify or categories certain crops as cash crops or commercial crops. Identification of certain crops as commercial or cash crops has many policy implications from the point of view of development of good organized markets and other infrastructure facilities such as roads, storage's (including cold storage's for perishables), communication, market information, banking services, etc.

1. Marketable surplus for foodgrains, particularly in a deficit state are low and such crops may not be considered as commercial crops in that area. But in Punjab, wheat which is a foodgrain crop is a commercial crop as its marketable surplus is around 85%.

2. All fruit crops are definitely commercial crops because their marketable surpluses are above 96%.

3. Similarly, vegetables are also commercial crops, which is evident from their marketable surpluses being above 96% and marketed surpluses above 85%.

4. Special mention needs to be made about milk. Some 25-30 years back, dairy activity was just carried out as subsidiary to crop production to meet the family requirement of milk and no surplus. But after the development of new high yielding cow and buffalo breeds, improvement in feeding and management practices of milk animals, certain of marketing facilities through Govt. Milk Schemes and Producer's Co-operatives, the milk production has increased very rapidly. It has spread in the rural area and it has now became an important commercial activity as can be seen from the marketable surpluses ranging from 77% to 92% with the farmers. On some farms, where number of crossbred cows or pure buffaloes is more than 5, dairy has become main enterprise surpassing crop production. Diary has assumed a commercial status providing regular cash income to farmers and employment to his family.

Some oil seed crops like groundnut, sunflower, safflower, soybean, castor and other crops like cotton and sugarcane are also recognized as commercial crops as the marketable surpluses in them are almost 100% and therefore they are cash crops for the farmers. In addition, there are some crops, which are grown in small pockets, but they have large marketable surpluses and hence they are cash crops for farmers in those areas. Examples are – Red chili, turmeric, tobacco, minor fruits, etc.

The solution to the problem of development, it is argued, is to take steps to increase agricultural productivity rather than get involved in the possibility of the failure of marketed agricultural surplus to grow. Since the peasant has a rather high propensity to save and since a large part of his incremental consumption consists of manufactured goods, the argument runs, it is incorrect and misleading to over-emphasis the problem of marketed surplus.

This line of argument, however, only indicates why marketed surplus may not fail to increase with rise in per capita agricultural production. In a predominantly agricultural country, like India, aiming at a high rate of capital formation, it is not enough that marketed surplus should rise with rise in production; the ratio of marketed surplus to production must raise enough to mobilize the savings potential in the agricultural sector to the utmost. It would not do, therefore, to ignore the problem of marketed surplus.

1.3 Relevance of the study:

The agricultural marketing plays an important role not only in stimulating production and consumption, but also in accelerating the pace of economic development. It is dynamic function but of primary importance in promoting economic development. For this reason, it has been described as the most important multiplier of agricultural development. India's age-old farming practices have taken a turn in recent years. There has been a technological breakthrough because of the evolution of high yielding variety seeds, increasing use of fertilizer, insecticides, pesticides, the installation of pumping sets, and tractorization. This technological breakthrough has led to a substantial increase in production on the farms and to the larger marketable and marketed surplus. To maintain this tempo and pace of increased production through technological development, an assurance of remunerative prices to the farmers are a prerequisite and this assurance can give to the farmer by developing an efficient marketing system.

The agricultural marketing system plays a dual role in economic development in countries whose resources are primarily agricultural. Increasing demands for money with which to purchase other goods leads to increasing sensitivity to relative prices on the part of the producer and specialization in the cultivation of those crops on which the returns are the greatest, subject to socio – cultural, ecological and economic constraints. The marketing system transmits the crucial price signals. On the other hand and in order to sustain the growth of the non – agricultural sector, resources have to be extracted from the agricultural sector – physical

resources to guarantee supplies of food and raw materials for the agro industry and financial resources for investment in non- farm economy as well as for re- investment in agriculture. An efficient agricultural marketing system leads to the optimization of resources use and output management. An efficient marketing system can also contributes to an increase in the marketable surplus by scaling down the losses arising out of inefficient processing, storage and transportation. As well, designed system of marketing can effectively distribute the available stock of modern inputs and thereby sustain a faster rate of growth in the agricultural sector. An efficient marketing system also ensures higher level of income for the farmers by reducing the number of middlemen or by restricting the commission on marketing services and the malpractice adopted by them in marketing of farm products. An efficient system guarantees the farmers better prices for farm products and induces them to invest their surpluses in the purchase of modern inputs so that productivity and production may increase. This again results in an increase in the marketed surplus and income of the farmers. If the producer does not have an easily accessible market outlet where he can sell his surplus produce, he has little incentive to produce more. The need for providing adequate incentives for increased production is, therefore, very, important and this can be made possible only by stream lining the marketing system.

A well-knit marketing system widens the market for the products by taking them to remote corners both within and outside the country, i.e., to areas far away from the production points. The widening of the market helps in increasing the demand on a continuous basis and thereby guarantees a higher income to the producer. An improved and efficient system of agricultural marketing helps in the growth of agro-based industries and simulates the overall development process of the economy. Many industries depend on agriculture for the supply of raw materials. An efficient marketing system helps the farmers in planning their production in accordance with the needs of the economy. This work is carried out through price signals. The marketing system helps the farmers in the adoption of new scientific and technical knowledge. New technology requires higher investment and farmers would invest only they are assumed of market clearance. The marketing system provides employment to millions engaged in the various activities, such as packaging, transportation, storage and processing. Persons like commission agents, broker, traders, retailer, weight men, hammal, packager and regulating staff are directly employed in the marketing system. This apart, several others find employment in supplying

goods and services required by the marketing system. Marketing activities add value to the product thereby increasing the nation's gross national product and net national product.

The marketing system is essential for the success of the development programs that are designed to uplift the population as a whole. Any plan of economic development that aims at diminishing the poverty of the agricultural population, reducing consumer food prices, earning more foreign exchange, to play special attention to the development of an efficient marketing for agricultural products.

In any developing economy, the producer's surplus of agricultural product plays a significant role. The quantity, which is actually made available to the non - producing population of the country. From the marketing point of view, this surplus is more important than the total production of commodities. The arrangement for marketing and the expansion of markets have to be made only for the surplus quantity available with the farmers, and not for the total production. The role at which agricultural production expands determines the pace of agricultural development, while the growth in the marketed surplus determines the pace of economic development. An increase in production must be accompanied by an increase in the marketable surplus for the economic development of the country. Though the marketing system is more concerned with the surplus which enters or is likely to enter the market, the quantum of total production is essential for this surplus.

The larger the production of commodity, the greater the marketed surplus of that commodity and vice-versa. The knowledge of marketed and marketable surplus helps the policy-makers as well as the traders. Price support programs are an integral part of agricultural policies necessary for stimulating agricultural production. The knowledge of quantum of marketable surplus helps in forming these policies. The procurement policy for changing the food grain through the public distribution system has to take into accounts the quantum and behavior of marketable and marketed surplus. Similarly, the traders have to decide their purchase strategies based on marketed quantities. Advanced estimates of the surplus of such commodity, which have the potential of external trades, are useful in decision related to export and import of the commodity. If surplus is expected to be less than what is necessary the country can plan for import and if surplus is expected to be more than what is necessary, avenues for exporting such a surplus can be explored. The knowledge of marketed surplus helps in developing an adequate

capacity of transport and storage system to handle it. With the above considerations in mind, the present study has been formulated in light of three important crops i.e. wheat, gram and tur of Madhya Pradesh with following specific objectives.

1.4 Objectives of the Study:

1. To estimate marketed and marketable surplus of wheat, gram and tur.

2. To estimate the retention of wheat, gram and tur for consumption, seed, feed, wages and other payments in kind.

3. To examine the role of various factors such as institutional, infrastructural, socioeconomic, etc. in influencing household marketed surplus.

1.5   Literature Review:

Many authors fail to distinguish between marketed and marketable surplus in their analysis (Krishna, 1965; Toquero, Duff, Anden-Lacsina and Hayami, 1975). Confusion as to definitions and distinctions employed gratly complicates comparisons between authors. Some define marketable surplus as all disposals others than consumption. This might include barter and in kind transfers, gifts and storage for seed or reserves in addition to sale. Krishna defines marketable surplus as the "marketed part of the output". Matlon includes all production above that necessary to satisfy some basic nutritional requirement in estimating some "minimum potential crop sales".

Marketed surplus has generally been defined as that portion of production which actually enters in the market. Some authors include the barter component in this category (Chinn, 1976 and Sharma and Gupta, 1970). Distress sales, where grain is sold soon after harvest in order to satisfy prior obligation and then repurchased or replaced later on are included in some definitions of marketed surplus but subtracted out of marketable surplus. In such case, marketed surplus would be a gross term and marketable surplus the net amount after repurchases. Where no repurchases occur, marketable surplus could be greater than marketed surplus. Marketable surplus will include marketed surplus as well as gifts in kind transfers and savings less any repurchases.

The value of the distribution between marketed and marketable surplus lies in the degree of responsiveness to price and the ability to collect data which upon analysis, can yield

information useful in explaining the decision making process of rural households producing partially or primarily for home consumption. From a behavioral standpoint, marketed surplus is important within the constraints of marketable surplus as well as total output.

It might be expected that with the increasing integration of subsistence farmer into the market economy, the percentage of marketed surplus which is actually sold (as opposed to barter or transfer) would increase. With increasing penetration of the cash economy it might further be expected that the exchange value of subsistence food staples involved in kind transfer or barter exchange would increasingly approximate their market price. In such cases, an understanding of the determinants of marketed surplus would be increasing relevance as a variable for planning purposes.

In his note on the "elasticity of the marketable surplus of a subsistence crop Raj Krishna (1962) pointed out the critical importance of understanding the behavior of market supply of food crops grown partly for home consumption. Raj Krishna (1962) commented that in a growing economy, the rate of growth of the urban industrial sector depends on the availability of food from the rural agricultural sector and developed a "Simple Model" incorporating market supply (M) as a function of output (Q) and consumption (C): $M = Q - C$. Similar rationales have also been mentioned by Bardhan and Bardhan (1971), Dixit (1969), Zarembka (1972) and Medani (1975). Medani also mentioned the importance of knowledge of the magnitude and sign of the elasticity of "marketable surplus" in the formulation of specific policies on "Agriculture and overall growth" with growing concern for meeting "basic needs", understanding marketed surplus behavior becomes important in the context of inter and intra household as well as inter sectoral welfare.

Focus on the feeding of urban centers and the feeling of industrial growth resulted in emphasis on the determination of aggregate price elasticities. The use of the term "Surplus" can be viewed as an indication of the orientation of interest towards that which could be extracted out of rural areas toward the urban.

Schools of thought regarding price responsiveness of marketed surplus span the spectrum from positive response to irrational behavior. Survey from various points of view were presented by Behrman (1968) and Askari & Cummings (1976). And found that that supply is inversely related to price. This thesis is generally based on the hypothesis that subsistence households have

17

a fixed demand for money and thus sell only enough to satisfy that demand (Newmark, 1959; Mathur and Ezekiel, 1961; Khatkhate, 1962; Boeke, 1953; Krishna, 1956; Ferris and Suh, 1972).

The reasoning employed by Mathur and Ezekie (1961) is that subsistence farmers save in kind, rather than in money. Their demand for money is assumed fixed by predetermined obligations and commitments, implying inelastic demand for nonfood goods. A change in price inversely affects the necessary sales of food staples and thus a back-ward bending supply curve would logically follow. Ferris and Suh (1972) found this consistent with empirical observation in Korea.

An alternative thesis also providing for instance where a negative marketed surplus response to price could be exhibited is that an increase in income resulting from an increase in price results in a larger demand for increased consumption of the food staple than the accompanying negative substitution effect on consumption and positive output supply effect (Olson, 1960; Krishna, 1965; Bardhan, 1970). The elasticity of marketed surplus will be positive if the elasticity of supply is greater than the price elasticity of home consumption. Among those postulating a positive supply response to price changes, there are some authors who assume zero income and price elasticities of demand in their estimation procedure (Behrman, 1966 & 1968). Thus making the elasticity of marketed surplus equivalent to the price elasticity of production or output.

If subsistence farmers were assumed to respond positively to price changes and their behavior is consistent with economic theory then the price elasticity of supply (output) would be expected to be greater than zero. If such is the case, and income and price elasticities of demand are assumed to be zero than the elasticity of marketed surplus must be positive while, this simplifies statistical specification of the models it limits the reliability of the results in understanding the small farmer decision – making process.

There is a body of literature which proposes that subsistence producers respond randomly or irrationally to price or respond to habit, cultural influences etc. (Becker, 1962; Dalton, 1962). Although little empirical evidence is available on subsistence crops statistical testing for cash crops marketed through official channels indicate a tendency for supply response to be positive and rational (Helleiner, 1975; Barber, 1960; Bauer, 1954 and Dean, 1966).

Most authors have estimated short and long run elasticities of output and marketed surplus using indirect methods as proposed by Krishna, 1962; Behrman, 1966 & 1968 and Bardhan and Bardhan, 1969. Krishna used his "Simple Model" to estimate plausible ranges for elasticities of wheat (Krishna, 1962). In addition, the model was used in several other indirect estimation attempts (Mubyarto, 1965; Mangahas, Recto and Ruttan, 1966).

Berhman (1966) developed an alternative model for use of time series data in the estimation of price elasticity of marketed surplus of Thai Rice. Among his criticism of the Krishna Model were Krishna's (1) failure to distinguish between actual and expected income and actual and expected production; (2) failure to incorporate income other than that from the sale of the subsistence crop in the demand for on-farm consumption; and (3) the implicit assumption that complete, rather than partial, adjustment to a change in price occurs in a single period. Berhman (1966) used a Nerlovian distributed log model in his formulation and claims to take account of total net income in the determination of on-farm consumption. (However, as noted previously his estimation for Thai rice are based on the assumption hence, negative the effect of a more complete accounting for income).

In Behrman's (1966) comparison of plausible ranges of price elasticity for wheat generated by the Krishna and Behrman models it was found that while the models converged when most of production was marketed they could actually differ in sign, as well as magnitude, when less than 50 per cent of output was marketed. A large part of the difference is attributed to the differing income formulations.

An indirect estimation procedure employed by Bardhan and Bardahn (1969) began with an estimation of rural and urban non-agricultural production. These figures were multiplied by national per capita consumption of cereals estimates and government distributions were subtracted out the residual being an estimate of the amount marketed by the agricultural population. This was then expressed as percentage of total cereals output and used to construct time series estimates of marketed surplus.

Several authors have employed direct estimation procedures which permitted some disaggregation. Among these are Bardhan (1970) in northern India, Toquero, Duff, Anden-Lucsina and Hayami (1975) in the Philippines and Medani (1975) in the Sudan. Bardhan (1970) computed short run price elasticities of marketed surplus of food grains in Northwest India and

found a negative relationship. The impact of change in price on total output was found to be positive in the relatively long run, allowing for lagged adjustment. The negative price elasticity of marketed surplus was found to be similar in magnitude for wealthier subgroups of farmers, but the coefficient remained negative.

Haessal (1975) used Bardhan's (1970) data to recompute elasticities based upon the criticism that the latter neglected to account for the feedback effect of supply on price. In Haessal's model marketed surplus was treated as a residual after the home consumption decision was made based upon price and income. (He found that marketed surplus response to be positive and found price and income responsiveness to be greater among large through not substantially so).

Medani, (1970, 1972 & 1975) indicated a positive relationship between price and supply in the short and long runs as well positive price elasticities of marketable surplus. In his 1975 article aggregate price elasticity of marketed surplus estimates for the short and long runs are 0.21 and 0.30 respectively at the 0.05 significance level. He found, however, that the elasticity varied significantly among his sample strata. Medani's (1975) article employs an adaptive expectations model and system of five structural equations, which are reduced to two in the elimination of unobservable variables. The dependent variables are marketable surplus and on-farm consumption. Marketable surplus was fitted as a linear function of lagged price and consumption, lagged and expected yields, lagged marketable surplus and a disturbance term. On-farm consumption was fitted as a function of price and family size as well as several lagged variables including price, income, family size and consumption.

Toquero, Duff, Anden-Lacsina and Hayami (1975) analyzed elasticity of marketable surplus using the result of a three year sample survey of rice producers in the Philippines. They found that price has a negligible effect on the allocation of output between home consumption and market sale. They however found high and positive output elasticity resulting in total price elasticity in the supply of marketable surplus which was positive. Their market supply price elasticity was between 0 and +0.3, while the partial price elasticity of home consumption ranged between 0 and -0.4. They found strong support for their hypothesis that marketable surplus increases "more than proportionally with output when the home consumption demands for rice is near a point of saturation".

In addition to price, number of other factors have been suggested as influencing marketed surplus. Among these farm size, production, income, wealth, family size, risk and uncertainty, debts and obligations, desire for leisure, etc.

Some research studies revealed that large and medium size farmers supply most of the marketed surplus. Marketed surplus directly related to size of farms (Parthasarathy and Rao, 1964; Rathi et. al. 1986; yaar et. al. 2006; Gupta, 1980; Tomar et. al. 1978; Reddy, 1987; Malik, 1992; Singh and Singh 1992; Uppendra et.al. 1998; Kumar, 1999). However, when marketed surplus is measured as a proportion of output there is some empirical evidence that the proportion marketed is greatest for very small and very large farms with medium sized farm marketing a smaller proportion. This results in a U-Shaped marketed surplus function. Such behavior can be interpreted as distress sale by smaller farmers and increasing marketable surplus for larger farmers as satiation in food grain consumption occurs.

Narain (1961) found that marketed surplus decreased as holding size increased to 15 acre and then increases with holding size (Krishna, 1965).when income groups were compared for Northern Nigeria (Matlon, 1977) found a similar relationship. King and Byerlee (1977) inferred a like relation in Sierra Leon using subsistence ratios showing the proportion of consumption which is home produced. The farmers on road side village dispose off more percentage of marketable surplus than the farmers of interior villages (Gupta, 1980).

The small farmers lagged behind large farmers mainly because of low per capita land and low production (Wycliff and Nath, 1972). The relation of family size to marketed surplus was found to be negative, while the elasticity of sale with respect to production was positive and large (Gupta, 1970). Sharma and Gupta (1970), studying peasant families in India and found a positive relation between holding size and the amount of grain for consumption per family member. This could be viewed as a wealth effect. Holdings were stratified into (1) 0 to 2.6 ha; (2) 2.61 to 5.2 ha. ; (3) 5.21 to 7.8 ha; and (4) greater than 7.8 ha. Regression equations were fitted with marketed surplus as the dependent variables. The resulting y axis intercept terms were all negative, indicating a minimum level of retention of bajra (millet) for consumption purposes.

Hence, it is clear that marketed surplus is a portion of production, which actually sold in market after deduction of quantity retained for home consumption, seed, payment of in-kind to labours and losses in post harvest activities. The farmers on road side village dispose of more

21

percentage of marketed surplus than farmers of interior village, the same has been found to be true for the villages connected with bridges. The quantum of marketed surplus increases with size of farms and had negative response to price. An increase in income resulting from an increase in price results in a large demand for increased consumption of the food staple than the accompanying negative substitution effect on consumption and positive output supply effect. The elasticity of marketable surplus will be positive if the elasticity of supply is grater than price elasticity of home consumption. Commercial/ cash crops marketed through official channels indicate a tendency for supply response to be positive and rational in these crops nearly more than 80 per cent output was marketed while, in food crops around 50 per cent of output was found to be marketed in these channels.

1.6   Limitations of the study

The present study is based on the primary and secondary data. The analysis of the secondary data obtained from the published and unpublished sources are limited to the availability of the data on various aspects of the study. The validity of the results of study is, therefore, based on the degree of reliability of the secondary data obtained. However, an attempt has been made to have an in-depth analysis of the data by adopting suitable analytical techniques to arrive at meaningful conclusion.

The primary data are pertaining to the agriculture year 2009-2010. Moreover, the farmers provided the information based on their recall memory. Thus, there is possibility of certain memory bias to enter in the presentation of data. Therefore, considerable care should be taken while generalizing the applicability of the results of this study to other areas. The study includes only those factors, which are within the control of farmers and contribute significantly towards the marketed surplus.

The study related to Hosangabad (Wheat), Vidisha (Gram) and Narshingpur (Tur) districts of the State. Therefore, results of present investigation may not be generalized in broad sense because of small sample and coverage of the study areas.

1.7 Organization of the study

This study is organized into five chapters. Chapter one covers the introductory part of the study followed by the coverage sampling design and methodology. Overview of foodgrain economic of state covered under chapter three. Chapter four deals with the empirical analysis of marketable and marketed surplus in the state and covers main feature of selected districts, sample households and factors affecting marketed surplus of wheat, gram and Tur. while summary, concluding observation and policy implication are given in chapter five followed by references and annexure.

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CHAPTER II

COVERAGE AND SAMPLING DESIGN

This chapter deals with the selection of crops, sampling techniques, nature and type of data required, tools of data collection, method of classification, tabulation and analysis of collected data and concepts used while interpretation of data.

2.1 Selection of Crops

Wheat, gram and tur crops have been selected for assessment of marketed surplus in Madhya Pradesh as these crops have remarkable position in the state and contributed 8.78% 43.40% and 12.45% in total production of wheat (86.87Million t), gram (7.58 Million t) and tur (2.65 Million t) respectively of India's production basket (Table 2.1).

Table 2.1: State wise share of selected crops in India

States	Area		Prodn.		Yield	
	Million Ha	% to India	Million tonnes	% to India	Kg/ha	% change to India
Wheat						
Uttar Pradesh	9.64	33.16	30	34.53	3112	4.15
Punjab	3.51	12.07	16.47	18.96	4692	57.03
Haryana	2.52	8.67	11.63	13.39	4615	54.45
Madhya Pradesh	4.34	14.93	7.63	8.78	1758	-41.16
Rajasthan	2.48	8.53	7.21	8.30	2907	-2.71
Bihar	2.1	7.22	4.1	4.72	1952	-34.67
Gujarat	1.27	4.37	4.02	4.63	3165	5.92
Maharashtra	1.31	4.51	2.3	2.65	1756	-41.23
Other	1.91	6.57	3.51	4.04	1726	-42.23
India	29.07	100.00	86.87	100.00	2988	0.00
Gram						
Madhya Pradesh	3.04	36.54	3.29	43.40	1081	18.53
Rajasthan	1.43	17.19	0.99	13.06	691	-24.23
Maharashtra	1.05	12.62	0.82	10.82	775	-15.02
UP	0.58	6.97	0.72	9.50	1248	36.84
Andhra Pradesh	0.57	6.85	0.52	6.86	920	0.88
Karnataka	0.8	9.62	0.38	5.01	473	-48.14
Gujarat	0.24	2.88	0.27	3.56	1138	24.78
Chhattisgarh	0.24	2.88	0.24	3.17	995	9.10
Haryana	0.08	0.96	0.07	0.92	911	-0.11
Bihar	0.06	0.72	0.06	0.79	1134	24.34
Odisha	0.04	0.48	0.03	0.40	695	-23.79
West Bengal	0.02	0.24	0.03	0.40	1116	22.37
0thers	0.17	2.04	0.17	2.24		
India	8.32	100.00	7.58	100.00	912	0.00
Tur						
Maharashtra	1.21	29.95	0.85	32.08	704	7.32
Karnataka	0.77	19.06	0.36	13.58	466	-28.96
Madhya Pradesh	0.53	13.12	0.33	12.45	625	-4.73
UP	0.32	7.92	0.29	10.94	891	35.82
Gujarat	0.24	5.94	0.26	9.81	1057	61.13
Andhra Pradesh	0.48	11.88	0.15	5.66	307	-53.20
Jharkhand	0.14	3.47	0.13	4.91	914	39.33
Odisha	0.14	3.47	0.12	4.53	813	23.93
Bihar	0.03	0.74	0.05	1.89	1897	189.18
Tamil Nadu	0.05	1.24	0.04	1.51	869	32.47
0thers	0.13	3.22	0.08	3.02		
India	4.04	100.00	2.65	100.00	656	0.00

2.2   Sample Design

A multistage sample technique has been used for selection of respondents for the study. At the first stage Hoshangabad, Vidisha and Narsinghpur districts have been selected purposively for Wheat, Gram and Tur respectively as these districts are the true representative of the crops having maximum production in the state. At the Second Stage two blocks namely; Powarkheda and Sohagpur, Vidisha and Ganjbasoda, and Karakbel and Saikheda were selected purposively in Hosangabad, Vidisha, and Narshingpur districts respectively as selected blocks had maximum production of these crops in the respective districts. Thus, overall 6 blocks were selected from the selected districts. Furthers two Villages were randomly selected from the list of villages of the selected blocks for the study in third stage. (Table 2.2) At the last stage, a list of all the growers of the selected villages of respective crops has been prepared and categorized according to their size of holding and 25 respondents have been selected from Marginal (below 1ha), Small (1-2 ha), Medium (2-4ha) and Large (above 4 ha) categories for each crops. Thus, the total sample size for each crop was 100 Households (HHs) and the study comprise of 300 HHs of 6 blocks and 3 districts of M.P.

Table 2.2 Number of respondents in different categories of farms in selected districts

Name of crops	Selected districts	Selected blocks	Selected villages	Size of farms				
				Marginal	Small	Medium	Large	Total
Wheat	Hosangabad	Babai	Nagwada	25	25	25	25	100
			Ari					
		Sohagpur,	Samakesali					
			Baghelkhedi					
Gram	Vidisha	Vidisha	Mirzapur	25	25	25	25	100
			Adampur					
		Ganjbasoda	Ambanagra					
			Kaji kiroda					
Tur	Narshingpur	Gotegaon	Mahua kheda	25	25	25	25	100
			Piperia kalan					
		Saikheda	Banskheda					
			Tumbda					
Total	3	6	12	75	75	75	75	300

All the districts (50) of Madhya Pradesh have been divided into major crop producing districts and other districts for analysis of time series secondary data related to the year 1999-2000 to 2009-10.

Hosangabad, Dhar, Ujjain, Harda, Vidisha, Raisen, Sehore, Indore, Dewas, Ratlam, Chhindwara, Morena, and Datia districts of M.P. have been selected as major wheat producing districts. These districts had contributed 51.60 percent of total production of the state and each districts has been contributed more than 2.50 per cent share in production of M.P. Apart from these, remaining districts have been considered as other wheat growing

districts for the analysis of trend of area, production and yield of the wheat in the state (Table 2.2).

Likewise; Vidisha, Narshingpur, Sagar, Raisen, Damoh, Dewas, Ujjain, Guna, Shajapur, Sehore, Panna, Rajgarh, and Jabalpur districts have been selected as major gram producing districts. These districts had contributed 64.14 per cent of total production of the state and each district has been contributed more than 2.75 per cent share in production in M.P. Apart from these, remaining districts have been considered as other gram growing districts for the analysis of trend of area, production and yield of the gram in the state (Table 2.3). Similarly top tur producing districts viz. Narshingpur, Chhindwara, Betul, Raisen, Khandwa, Sidhi, Jabalpur, Hosangabad, Khargone, Seoni, Rewa, and Satna districts of M.P. had also been selected as major tur growing districts. These districts had contributed 69.78 per cent of total production of the state and each district contributed more than 4.90 per cent share in production in M.P. Apart from these, remaining districts have been considered as other tur growing districts for the analysis of trend of area, production and yield of the tur in the state. The analysis has also been done for all these 3 crops viz. wheat, gram and tur for the state as a whole for the period under study.
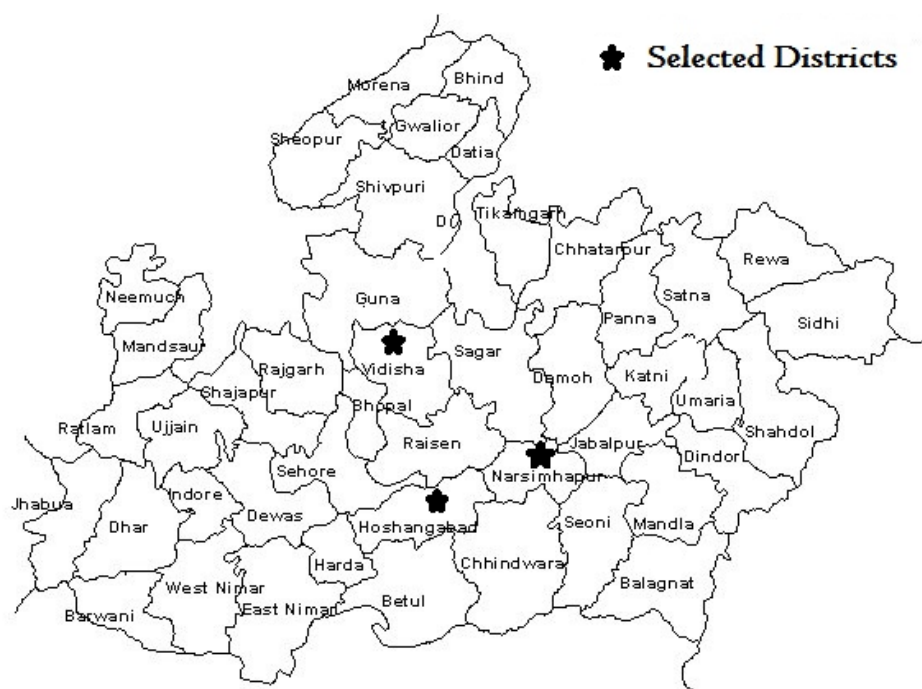
Fig 2.1: Map showing selected districts for the study in M.P.

Table2.3: Production of Wheat in different Districts of M.P. (000't)

Districts	Tn Average ending 2010	Percentage to M.P.
Hoshangabad	624.9	8.57
Dhar	411.867	5.65
Ujjain	358.1	4.91
Harda	344.067	4.72
Vidisha	272.6	3.74
Raisen	260.7	3.58
Sehore	259.833	3.57
Indore	237.1	3.25
Dewas	232.3	3.19
Ratlam	223.467	3.07
Chhindwara	199.2	2.73
Morena	188.833	2.59
Datia	183.467	2.52
Major Wheat Producing Districts	**3796.43**	**52.09**
Gwalior	175.833	2.41
Shivpuri	170.8	2.34
Narshingpur	166.367	2.28
Shajapur	165.5	2.27
Sagar	164.2	2.25
Jabalpur	161.033	2.21
Betul	155.467	2.13
Mandsaur	150.967	2.07
Khargone	146	2
Bhind	137.933	1.89
Askhonagar	136.067	1.87
Rewa	132.567	1.82
Guna	131.367	1.8
Chhatarpur	125.033	1.72
Bhopal	124.7	1.71
Satna	120.367	1.65
Khandwa	110.433	1.52
Damoh	106.667	1.46
Tikamgarh	105.133	1.44
Rajgarh	102.567	1.41
Seoni	94.933	1.3
Sheopur kalan	91.067	1.25
Neemuch	73.033	1
Panna	66.467	0.91
Jhabua	60.6	0.83
Barwani	58.967	0.81
Sidhi	56.433	0.77
Katni	51.767	0.71
Singroli	28.9	0.4
Mandla	25.567	0.35
Alirajpur	25.3	0.35
Umaria	20.567	0.28
Burhanpur	19.633	0.27
Shahdol	18.833	0.26
Dindori	17.833	0.24
Balaghat	12.3	0.17
Anuppur	9.133	0.13
Non-reported	**7.4**	**0.1**
Other Districts	**3527.73**	**48.38**
M.P.STATE	**7288.03**	**100**

Table 2.4: Production of Gram in different Districts of M.P. (000't)

Districts	Tn Average ending 2010	Percentage to M.P.
Vidisha	212.6	8.35
Guna (+ Ashok Nagar)	172.2	6.76
Narshingpur	156.2	6.13
Sagar	150.5	5.91
Raisen	150.3	5.90
Damoh	136.6	5.36
Dewas	120.3	4.72
Ujjain	119.1	4.68
Ashoknagar	106.4	4.18
Shajapur	97.7	3.84
Sehore	97.3	3.82
Panna	77.7	3.05
Rajgarh	76.3	3.00
Jabalpur	66.6	2.62
Major Gram Producing districts	**1739.8**	**68.33**
Chhatarpur	61.6	2.42
Hoshangabad	57.9	2.27
Dhar	57.5	2.26
Indore	56.2	2.21
Shivpuri	50.6	1.99
Rewa	49.7	1.95
Ratlam	42.4	1.67
Satna	41.5	1.63
Chhindwara	38	1.49
Bhopal	33.3	1.31
Betul	31.1	1.22
Seoni	28.4	1.12
Datia	26.5	1.04
Harda	23.5	0.92
Mandsaur	22.8	0.90
Bhind	21.6	0.85
Gwalior	21.1	0.83
Tikamgarh	18.9	0.74
Neemuch	18.6	0.73
Katni	13.6	0.53
Khandwa	13	0.51
Sidhi	12.7	0.50
Jhabua	11.4	0.45
Morena	7.6	0.30
Singroli	7.2	0.28
Sheopur kalan	6.8	0.27
Balaghat	5.8	0.23
Alirajpur	4.4	0.17
Khargone	4	0.16
Dindori	3.5	0.14
Mandla	3.2	0.13
Umaria	2.4	0.09
Burhanpur	2.2	0.09
Barwani	1.8	0.07
Shahdol	1.3	0.05
Anuppur	1.3	0.05
Non-reported	**3.1**	**0.12**
Other districts	**806.5**	**31.67**
M.P.STATE	**2546.3**	**100.00**

Table 2.5: Production of Tur in different Districts of M.P. (000't)

Districts	Tn Average ending 2010	Percentage to M.P.
Narshingpur	32.2	13.74
Chhindwara	28.43	12.13
Sidhi (+ Signorelli)	19.23	8.20
Betul	17.77	7.58
Raisen	12	5.12
Khandwa	9.4	4.01
Singroli	8.8	3.75
Jabalpur	8.2	3.50
Hosangabad	7.63	3.26
Khargone	6.73	2.87
Seoni	6.53	2.79
Rewa	6.27	2.68
Satna	4.9	2.09
Major Tur Producing Districts	**168.09**	**71.71**
Dewas	4.17	1.78
Burhanpur	3.9	1.66
Sehore	3.83	1.63
Shahdol	3.7	1.58
Chhatarpur	3.43	1.46
Mandla	3.07	1.31
Katni	2.9	1.24
Balaghat	2.47	1.05
Rajgarh	2.47	1.05
Morena	2.4	1.02
Panna	2.33	0.99
Damoh	2.3	0.98
Bhind	2.2	0.94
Dindori	2.1	0.90
Harda	2.1	0.90
Umaria	2.03	0.87
Jhabua	2.03	0.87
Dhar	1.9	0.81
Barwani	1.73	0.74
Sagar	1.67	0.71
Anuppur	1.43	0.61
Alirajpur	1.3	0.55
Shajapur	1.2	0.51
Vidisha	0.8	0.34
Ujjain	0.7	0.30
Datia	0.63	0.27
Ratlam	0.57	0.24
Sheopur kalan	0.53	0.23
Bhopal	0.5	0.21
Guna	0.47	0.20
Mandsaur	0.37	0.16
Indore	0.27	0.12
Shivpuri	0.27	0.12
Gwalior	0.2	0.09
Neemuch	0.13	0.06
Tikamgarh	0.1	0.04
Ashoknagar	0.1	0.04
Non-reported	**4**	**1.71**
Other Districts	**66.3**	**28.29**
M.P.STATE	**234.39**	**100.00**

2.3 Main features of selected districts

The population parameters, land utilization pattern, cropping pattern, irrigation status, size of holdings were taken into consideration for the selected districts (Hosangabad, Vidisha, and Narshingpur) in this subhead.

Vidisha district situated at $23^0.20$" – $24^0.22$" north longitude and $77^0.16$" – $78^0.18$" east latitude in the globe. It is situated 428.9 meter above from mean sea level there are 7 *janpad panchayat* comprises in 58 *gram panchayat* and 1540 villages. As per 2011 census the total population of the district was 1458212 out of which constitute 52.72 per cent male and 47.28 per cent female. The sex ratio per thousand male was found to be 897. The average rainfall of the district was 966 mm (2011).

Table 2.6: Profile of Districts

S. No.	Particulars	Vidisha	Narsinghpur	Hoshangabad
1	Total Population(2011)	1458212	1092141	1240975
A	M	768799 (52.72)	567913 (52.00)	648970 (53.00)
B	F	689413 (47.28)	524228 (48.00)	592005 (47.00)
2	Sex ratio per thousand male	897	910	917
3	North Longitude	$23^0.20$" - $24^0.22$"	$22^0.55$" - $23^0.15$"	$21^0.53$" - $22^0.59$"
4	East Latitude	$77^0.16$" - $78^0.18$"	$78^0.38$" - $79^0.38$"	$76^0.47$" - $79^0.44$"
5	Height from sea level (meter)	428.9	359.8	331
6	Gram panchayat	581	457	428
7	Total village	1540	1052	923
8	Zanpad Panchayat	7	6	7
9	Literacy percent	61.83	77.12	76.5
10	Average Rainfall (mm)	966	785	1343.6

Figure in parenthesis show percent to total

Narshingpur district situated at $22^0.55$" – $23^0.15$" north longitude and $78^0.38$" – $79^0.38$" east latitude in the globe. It is situated 359.8 meter above from mean sea level. There are 6 *janpad panchayat* comprises in 457 *gram panchayat* and 1052 villages. As per 2011 census the total population of the district was 1092141 out of which 52.00 per cent male and 48.00 per cent female. The sex ratio per thousand male was found to be 910. The average rainfall of the district was 785 mm (2011).

Hosangabad district situated at $21^0.53$" – $22^0.59$" north longitude and $76^0.47$" – $79^0.44$" east latitude in the globe. It is situated 331 meter above from mean sea level. There are 7 *janpad panchayat* comprises in 428 *gram panchayat* and 923 villages. As per 2011 census the total population of the district was 1240975 out of which 53.00 per cent male and

47.00 per cent female. The sex ratio per thousand male was found to be 917. The average rainfall of the district was 1343.6 mm (2011).

The total geographical area of the district Vidisha was 730197 ha, out of which 15.01 per cent land was under forest. The 72.84 per cent of land comes under net area sown while only 3.22 per cent was under non agriculture use, the cropping intensity of the district was found to be 148.87 per cent (Table 2.7).

The total geographical area of the district Narshingpur was 513651 ha, out of which 26.52 per cent land was under forest. The 59.12 per cent of land comes under net area sown while only 4.76 per cent was under non agriculture use, the cropping intensity of the district was found to be 128.56 per cent (Table 2.7).

The total geographical area of the district Hosangabad was 493355 ha, out of which 16.37 per cent land was under forest. The 62.14 per cent of land comes under net area sown while only 5.12 per cent was under non agriculture use the cropping intensity of the district was found to be 175.98 per cent (Table 2.7).

Table 2.7: Land use classification

(In ha)

S. No	Particulars	Vidisha		Narsinghpur		Hoshangabad	
		Area	% to Geographical Area	Area	% to Geographical Area	Area	% to Geographical Area
1	Geographical Area	730197	100.00	513651	100.00	493355	100.00
2	Forest	109615	15.01	136207	26.52	80776	16.37
3	Area not available for cultivation	49038	6.72	25712	5.01	46264	9.38
4	Area under non agricultural land (excluding fallow land)	23519	3.22	24425	4.76	25276	5.12
5	Area under cultivable waste land	9428	1.29	14622	2.85	23254	4.71
6	Fallow land	6697	0.92	9035	1.76	11228	2.28
7	Net area sown	531900	72.84	303650	59.12	306557	62.14
8	Double cropped area	259943		86733		233019	
9	Gross area sown	791843		390383		539490	
10	Cropping intensity (%)	148.87		128.56		175.98	

The Vidisha district had 48.95 per cent of net irrigated area to gross cultivated area. The 35.42 per cent, 23.28 per cent and 12.01 per cent of total net area was found to be irrigated by tube well, well and canal respectively. The 27.29 per cent of net area irrigated was found to be irrigated by other sources of irrigation (Table 2.8).

The Narshingpur district had 59.00 per cent of net irrigated area to gross cultivated area. The 51.96, 43.31 and 0.61 per cent of total net area was found to be irrigated by well, tube well and canal respectively. The 4.11 per cent of net area irrigated was found to be irrigated by other source of irrigation (Table 2.8).

The Hosangabad district had 96.11 per cent of net irrigated area to gross cultivated area. The 19.27 per cent, 21.02 per cent and 43.19 per cent of total net area was found to be irrigated by well, tube well and canal respectively. The 16.27 per cent of net area irrigated was found to be irrigated by other sources of irrigation (Table 2.8).

Table 2.8: Source of irrigation in different districts

S.No	Particulars	Vidisha			Narsinghpur			Hoshangabad		
		Number	Area	% to total	Number	Area	% to total	Number	Area	% to total
1	Canal govt./Private	11	31258	12.01	13	1095	0.61	5	127254	43.19
2	Tube well	22311	92205	35.42	4738	77507	43.31	6715	61946	21.02
3	Well	17085	60614	23.28	25908	92981	51.96	26345	56784	19.27
4	Tank	23	5195	2	1	9	0.01	16	721	0.24
5	Other sources	0	71045	27.29	0	7351	4.11	0	47933	16.27
	Total	39430	260317	100	30660	178943	100	33081	294638	100
	Percentage of Net Irrigated area to gross Cultivated area	48.95			59			96.11		

The Vidisha district covered 791843 ha of land under total food and non-food crops. Out of which area under total food and non food crops was 67.61 and 32.39 per cent respectively. The district is pre dominantly pulse growing district, occupied 40.40 per cent area under pulses. In pulse group gram (23.17%) occupied the highest area apart from pulses, cereals occupied 26.76 per cent area and wheat (26.17%) occupied maximum area under cultivation. Soybean an oilseed crop also grown in kharif season occupied 31.47 per cent area (Table 2.9).

The Narshingpur district covered 390383 ha of land under total food and non-food crops. Out of which area under total food and non food crops was 85.77 and 14.23 per cent respectively. The district is pre dominantly pulse growing district, occupied 56.40 under pulses. In pulse group gram (34.98%) had occupied the highest area followed by tur (6.33%) under cultivation. Apart from pulses, cereals occupied 19.76 per cent area and wheat (14.40%) had occupied maximum area under cultivation followed by paddy (3.58%) and

jowar (1.05%). Soybean is an oilseed crops grown in kharif season occupied 13.27 per cent area (Table 2.9).

The Hosangabad district covered 539983 ha of land under total food and non-food crops. Out of which area under total food and non food crops was 59.11 and 49.89 per cent respectively. The district is pre dominantly cereal growing district, occupied 49.59 per cent area wheat (44.86%) occupied the highest area under cereal, pulses occupied 7.83 per cent area. In pulses, gram (5.23%) occupied maximum area under cultivation followed by tur (2.04%). Soybean, an oilseed crop grown in kharif season occupied 40.13 per cent area (Table 2.9).

Table 2.9: Cropping pattern of selected district (2011)

(in ha)

S.N.	Particulars	Vidisha		Narsinghpur		Hoshangabad	
		Area	% to total	Area	% to total	Area	% to total
1	Wheat	206858	26.12	56212	14.40	242251	44.86
2	Paddy	374	0.05	13984	3.58	23723	4.39
3	Jowar	421	0.05	4108	1.05	785	0.15
4	Maize	3992	0.50	550	0.14	999	0.19
5	Other Cereals	289	0.04	2286	0.59	3	0.00
6	**Total Cereals**	**211934**	**26.76**	**77140**	**19.76**	**267761**	**49.59**
7	Gram	183469	23.17	136556	34.98	28246	5.23
8	Tur	6236	0.79	24703	6.33	11004	2.04
9	Urd	45386	5.73	13613	3.49	240	0.04
10	Other Pulses	84848	10.72	45311	11.61	2785	0.52
11	**Total Pulses**	**319939**	**40.40**	**220182**	**56.40**	**42275**	**7.83**
12	Sugarcane	275	0.03	32590	8.35	2652	0.49
13	Total Fruits	211	0.03	23	0.01	801	0.15
14	Total vegetables	2080	0.26	3712	0.95	4657	0.86
15	Total spices	898	0.11	1176	0.30	1062	0.20
16	Other Food Crops		0.00	0	0.00	0	0.00
17	**Total Food Crops**	**535337**	**67.61**	**334823**	**85.77**	**319206**	**59.11**
18	Til	67	0.01	708	0.18	216	0.04
19	Linseed	55	0.01	6	0.00		0.00
20	Groundnut	381	0.05	60	0.02	50	0.01
21	Rapeseed and Mustered	864	0.11	140	0.04		0.00
22	Soybean	249232	31.47	51811	13.27	216702	40.13
23	Others	7	0.00	405	0.10	0	0.00
24	**Total Oil Seed**	**250606**	**31.65**	**53130**	**13.61**	**216968**	**40.18**
25	Medicinal and Narcotics	0	0.00	49	0.01	0	0.00
26	Fodder crops	5884	0.74	1507	0.39	0	0.00
27	Other Non Food crops	16	0.00	0	0.00	3809	0.71
28	Total non food crops	256506	32.39	55560	14.23	220777	40.89
29	**Total(Gross cropped Area)**	**791843**	**100.00**	**390383**	**100.00**	**539983**	**100.00**

In Hoshangabad district the yield of wheat (3637 kg/ha), paddy (2419 kg/ha), maize (1770 kg/ha), gram (1424 kg/ha), lentil (495 kg/ha), sugarcane (3323 kg/ha) was found maximum as compared to others selected districts i.e. Vidisha and Narsinghpur. The yield of

tur (892 kg/ha), urad (590 kg/ha), linseed (692 kg/ha), groundnut (2633 kg/ha), mustard (1156 kg/ha) and soybean (187.9 kg/ha) was found maximum yield in Narsinghpur as compared to Vidisha and Hoshangabad. In Vidisha the yield of Jowar (2697 kg/ha), and Til (637 kg/ha) was found maximum as compared to Narsinghpur and Hoshangabad districts (Table 2.10).

Table 2.10: Yield of major crops in selected district (2011)

(in kg/ha)

S.N.	Particulars	Vidisha	Narsinghpur	Hoshangabad
1	Wheat	1913	3458	3637
2	Paddy	1062	1519	2419
3	Jowar	2697	2422	1225
4	Maize	1733	1598	1770
5	Gram	1083	1046	1424
6	Tur	398	892	671
7	Urd	412	590	347
8	Masoor (Lentil)	441	330	495
9	Sugarcane	1981	4386	3323
10	Til	637	593	
11	Linseed	662	692	542
12	Groundnut	1618	2633	1136
13	Rapeseed and Mustered	816	1156	1068
14	Soybean	1440	1879	1494

Source: - Department of Farmers Welfare and Agriculture Development, MP (2011)

In Vidisha the total number of holding were found to be 160135 out of which small holding found to be maximum (41069) followed by marginal (40782), semi-medium (37317), medium (31682) and large (9285). These holdings occupied 546452 ha of land. The medium size occupied the highest area (35.95%) followed by large (30.20%), semi-medium (19.24%), small (10.82%) and marginal (3.81%). The average size of holding of the district was found to be 3.41 ha (Table 2.11).

There were 133738 number of land holding found in the Narshingpur district, out of which marginal holding (46432) were found to be maximum followed by small (42018), semi-medium (29450), medium (14090) and large (1748). These holdings occupied 282894.4 ha of land. The medium size (29.53 %) occupied the highest area followed by semi-medium (29.17%), small (22.73%), large (9.33%) and marginal (9.24%). The average size of holding of the district was found to be 2.12 ha (Table 2.11).

There were 136736 numbers of land holding found in the Hoshangabad district, out of which small holding (35511) were found to be maximum followed by semi-medium (33275), medium (29986), marginal (28495) and large (9469). These holding occupied 511587 ha of land. The medium size (35.33 %) occupied the highest area followed by large (32.87%),

semi-medium (18.17%), small (10.51%) and marginal (3.11%). The average size of holding of the district was found to be 3.74 ha (Table 2.11).

Table 2.11: Numbers & Area (ha) under different size of Land Holding

S. No.	Particulars	Vidisha			Narsinghpur			Hoshangabad*		
		Numbers	Area	% to total	No.	Area	% to total	No.	Area	% to total
1	Marginal(0-1 ha)	40782	20814	3.81	46432	26140.29	9.24	28495	15924	3.11
2	Small(1-2 ha)	41069	59005	10.80	42018	64305.01	22.73	35511	53787	10.51
3	Semi medium(2-4ha)	37317	105149	19.24	29450	82530.6	29.17	33275	92948	18.17
4	Medium(4-10)	31682	196460	35.95	14090	83525.23	29.53	29986	180767	35.33
5	Large(above10 ha)	9285	165024	30.20	1748	26393.23	9.33	9469	168161	32.87
6	Total	160135	546452	100.00	133738	282894.4	100.00	136736	511587	100.00
7	Average size of holding	3.41			2.12			3.74		

*1995-96

The selected districts were found to be poor in farm mechanizations. The number of plough (0.36/farm), bullock carts (0.20/farm) and electric pumps (0.19/farm) were found more in Narsinghpur as compared to Vidisha and Hoshangabad districts, while numbers of tractor (0.13/farm) and diesel pump (0.16/farm) were found more in Vidisha as compared to Narsinghpur and Hoshangabad (Table 2.12).

Table 2.12: Farm mechanization (2010-11) (Numbers)

Districts	Vidisha	Narsinghpur	Hoshangabad
Plough	29348 (0.18)	47592 (0.36)	24258 (0.18)
Bullock cart	4127 (0.03)	26215 (0.20)	11436 (0.08)
Tractors	20669 (0.13)	4397 (0.03)	10543 (0.08)
Diesel Pump	25870 (0.16)	430 (0.00)	4085 (0.03)
Electric Pump	22429 (0.14)	24810 (0.19)	19326(0.14)
Sugarcane Crushers			
1.Bullock operated	0	0	0
2.Power operated	0	1135	96
Ghanies	0	0	0

Sources: - District Statistics Book of Hoshangabad, Vidisha & Narsinghpur, 2011, (Figure in parenthesis shows Number of Machinery per farm)

2.4 The Data

Both primary and secondary data were collected for the study.

2.4.1 Primary Data

Primary data were collected from the sample respondents for the study through interview schedule provided by the coordinator of the study. The primary data includes main features of respondents; viz. socio economic profile , land utilization pattern, ownership pattern, cropping pattern, acreage and yield of selected crops and investment pattern, crop losses at different stages of handling, retention of production for home consumption, seed, wages to labours in kind etc.

2.4.2 Secondary Data

The time series secondary data were collected for the study from the year 1999-2000 to 2009-10. These data have been collected for area, production and productivity of selected crops, cropping pattern, marketed surplus and consumption of major inputs and services viz. area under high yielding varieties, irrigated area, fertilizer consumption, farm mechanization, credit, crop insurance etc. . These data have been collected from different sources i.e. Department of Farmers' Welfare and Agricultural Development (Agriculture),, Agricultural statistics of Madhya Pradesh and Department of Statistics of various selected districts..

2.5   Classification, Tabulation and Analysis of data

The collected data have been classified, tabulated and analysed in light of the stated objective of the study. Suitable econometrics and statistical tools have been used to draw conclusions. To analyse the factors affecting marketed surplus, the multiple regression model has been used considering following independent variables.

x_1	=	Production (t)
x_2	=	Area under crop (ha)
x_3	=	Home Consumption (kg)
x_4	=	Retained for Seed (kg)
x_5	=	Retained for wages (Rs)
x_6	=	Type & mode of transportation dummy (Bullock Cart 0, Tractor trolly 1)
x_7	=	Type of road dummy (Kachha 0, Pucca 1)
x_8	=	Family Members (Numbers)
b_1 to b_8	=	Regression Coefficient
a	=	Constant or intercept value
x_1 to x_8	=	Independent variables

2.6 Concept Used

- **Marginal Farmer:** The House hold who hold up to 1 ha of land**.**
- **Small Farmer:** The House hold who hold 1.01-2 ha of land.
- **Medium farmer:** The House hold who hold 2.01-5 ha of land.

- **Large Farmer:** The House hold who hold above 5 ha of land.

- **Marketable Surplus:** Total production- total retention for various purposes (family consumption, seed, feed, kind payment to labourers etc.)

- **Marketed Surplus:** The surplus actual sold in the market

- **Factors affecting Marketed Surplus:** Total production, Household size, Quantity retention for seed, Types of Road, Types of storage, Distance from Mandi

2.7 Limitation of Data

The primary and secondary data has been collected for the study. Following are the some limitations of the data.

1. The secondary data related to the study have been only for the period of one decade instead of 4 decade due to the reason that new Madhya Pradesh has been formed in 1999. The state wise data available only for this period. Hence, all the secondary data related to 2001-10.

2. The primary data collected for the study was totally based on the memory of the respondents as the farmers of the state not maintained any record of their farm practices.

3. Only top major districts related to selected crops has been considered for in depth analysis of time series secondary data. The rest of the districts have been considered as other districts for selected crops.

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CHAPTER III

OVERVIEW OF FOODGRAINS ECONOMY OF STATE

This chapter deals with the structural transformation of the state Madhya Pradesh, changing structure of state agriculture, trends in area, production and productivity of selected crops i.e. wheat, gram and tur in different districts of Madhya Pradesh, marketed surplus ratio of wheat, gram and tur (2001-2010) and trend in consumption of major inputs and services in Madhya Pradesh.

3.1   Structural transformation of state Madhya Pradesh

The changing sectoral shares of the economy in Madhya Pradesh and economic activities have shown structural changes over a period of time and primary sector is experiencing a decline in terms of share in Gross State Domestic Products (GSDP). The sector-wise distribution of GSDP in Madhya Pradesh at constant rate and current rate (2004-05) along with percentage distribution presented in tables 3.1 to 3.4. The data presented in table 3.1 showed that GSDP of Madhya Pradesh at constant rate (2004-05) has been increased from Rs. 11292689 in 2004-05 to Rs. 1359851 in 2007-08.

Table 3.1: Gross State Domestic Products of Madhya Pradesh at constant price (2004 - 05)

Particulars	2004 – 05	2005 - 06	2006 - 07	2007 - 08	Percentage change over 2004-05 in		
					2005 - 06	2006 - 07	2007 - 08
Agriculture (including animal husbandry)	2753979	2973694	3055971	3001998	7.98	10.97	9.01
Forestry & logging	342010	342784	336789	341840	0.23	-1.53	-0.05
Fishing	27841	27399	29628	27626	-1.59	6.42	-0.77
Primary Sector	**3123830**	**3343877**	**3422388**	**3371464**	**7.04**	**9.56**	**7.93**
Mining & quarrying	544934	549690	598917	665800	0.87	9.91	22.18
Manufacturing – Registering	760612	831841	1166644	1201646	9.36	53.38	57.98
Manufacturing - Un Registering	495117	513766	559692	603009	3.77	13.04	21.79
Construction	932423	1013164	1015929	1222070	8.66	8.96	31.06
Electricity, gas & water supply	332722	301425	405049	276044	-9.41	21.74	-17.03
Secondary Sector	**3065808**	**3209886**	**3746231**	**3968569**	**4.70**	**22.19**	**29.45**
Railways	198495	199365	246656	243531	0.44	24.26	22.69
Transport by other means & Storage	332432	359100	388945	422881	8.02	17.00	27.21
Communication	132886	158537	189582	222562	19.30	42.67	67.48
Trade, hotels and restaurants	1534159	1565089	1765516	1904838	2.02	15.08	24.16
Banking & Insurance	410720	485558	581573	655046	18.22	41.60	59.49
Real estate, ownership of dwellings and business services	923724	978980	1038278	1103997	5.98	12.40	19.52
Public administration	554567	558118	535024	558514	0.64	-3.52	0.71
Other services	1016068	1033436	1075419	1147169	1.71	5.84	12.90
Tertiary Sector	**5103051**	**5338183**	**5820993**	**6258538**	**4.61**	**14.07**	**22.64**
Total	**11292689**	**11891946**	**12989612**	**13598571**	**5.31**	**15.03**	**20.42**

Overall economy of Madhya Pradesh has increased by 5.31 per cent, 15.03 per cent and 20.42 per cent respectively in the year 2005-06, 2006-07 and 2007-08 over the year 2004-05. The primary, secondary and tertiary sector contributed 24.79 per cent, 29.18 per cent and 46.02 per cent respectively in GSDP of Madhya Pradesh (2007-08)

The share of primary sector in GSDP has been found to be decreased from 27.66 per cent (2004-05) to 24.79 per cent (2007-08), while the share of secondary sector and tertiary sector increased respectively from 27.15 per cent (2004-05) to 29.18 per cent (2007-08) and 45.19 per cent (2004-05) to 46.02 per cent (2007-08). The share of agriculture sector has also been found to be decreased from 24.39 per cent (2004-05) to 22.08 per cent (2007-08) in GSDP of Madhya Pradesh.

Table 3.2: Percentage contribution of different sectors in Gross State Domestic Products at Constant Rate (2004-05)

Particulars	2004 - 05	2005 – 06	2006 - 07	2007 - 08
Agriculture (including animal husbandry)	24.39	25.01	23.53	22.08
Forestry & logging	3.03	2.88	2.59	2.51
Fishing	0.25	0.23	0.23	0.20
Primary Sector	27.66	28.12	26.35	24.79
Mining & quarrying	4.83	4.62	4.61	4.90
Manufacturing – Registering	6.74	6.99	8.98	8.84
Manufacturing - Un Registering	4.38	4.32	4.31	4.43
Construction	8.26	8.52	7.82	8.99
Electricity, gas & water supply	2.95	2.53	3.12	2.03
Secondary Sector	27.15	26.99	28.84	29.18
Railways	1.76	1.68	1.90	1.79
Transport by other means & Storage	2.94	3.02	2.99	3.11
Communication	1.18	1.33	1.46	1.64
Trade, hotels and restaurants	13.59	13.16	13.59	14.01
Banking & Insurance	3.64	4.08	4.48	4.82
Real estate, ownership of dwellings and business services	8.18	8.23	7.99	8.12
Public administration	4.91	4.69	4.12	4.11
Other services	9.00	8.69	8.28	8.44
Tertiary Sector	45.19	44.89	44.81	46.02
Total	100.00	100.00	100.00	100.00

The contribution of agriculture, forestry, fishing, electricity, public administration, other services and real estate to GSDP has been found to be decreased, while mining and quarrying, manufacturing, construction, railways, transportation, communication, trade, hotel, restaurant, banking and insurance increased in the year 2007-08 over the year 2004-05.

At current prices the per capita income increased from Rs. 11292689 (2004-05) to 16137939 (2007-08) increased by 42.91 per cent in the 2007-08 as compared to the year 2004-05 (Table 3.3).

Table 3.3: Gross State Domestic Products of Madhya Pradesh at current price (2004 - 05)

Particulars	2004 - 05	2005 - 06	2006 - 07	2007 - 08	Percentage change over 2004-05 in		
					2005 - 06	2006 - 07	2007 - 08
Agriculture (including animal husbandry)	2753979	3058330	3415396	3593132	11.05	24.02	30.47
Forestry & logging	342010	364771	383378	413820	6.66	12.10	21.00
Fishing	27841	27725	33287	31888	-0.42	19.56	14.54
Primary Sector	**3123830**	**3450826**	**3832061**	**4038840**	10.47	22.67	29.29
Mining & quarrying	544934	581329	621464	794256	6.68	14.04	45.75
Manufacturing – Registering	760612	859662	1274694	1402849	13.02	67.59	84.44
Manufacturing - Un Registering	495117	531647	616286	703572	7.38	24.47	42.10
Construction	932423	1076884	1155614	1492048	15.49	23.94	60.02
Electricity, gas & water supply	332722	326636	458967	314190	-1.83	37.94	-5.57
Secondary Sector	**3065808**	**3376158**	**4127025**	**4706915**	10.12	34.61	53.53
Railways	198495	196046	265450	278168	-1.23	33.73	40.14
Transport by other means & Storage	332432	387287	459550	526232	16.50	38.24	58.30
Communication	132886	144709	148886	156035	8.90	12.04	17.42
Trade, hotels and restaurants	1534159	1637451	1971304	2253668	6.73	28.49	46.90
Banking & Insurance	410720	450782	526085	586541	9.75	28.09	42.81
Real estate, ownership of dwellings and business services	923724	1058593	1216285	1455123	14.60	31.67	57.53
Public administration	554567	602717	626567	688236	8.68	12.98	24.10
Other services	1016068	1123030	1284468	1448181	10.53	26.42	42.53
Tertiary Sector	**5103051**	**5600615**	**6498595**	**7392184**	9.75	27.35	44.86
Total	**11292689**	**12427599**	**14457681**	**16137939**	10.05	28.03	42.91

The share of primary sector in GSDP has also been found to be decreased from 27.66 per cent (2004-05) to 25.03 per cent (2007-08), while the share of secondary sector and tertiary sector increased respectively from 27.15 per cent (2004-05) to 29.17 per cent (2007-08) and 45.19 per cent (2004-05) to 45.81 per cent (2007-08) at current rate. The share of agriculture sector has also been found to be decreased from 24.39 per cent (2004-05) to 22.27 per cent in GSDP of Madhya Pradesh at current rate also.

The contribution of agriculture, forestry, fishing, electricity, public administration, communication, other services and real estate to GSDP has been found to be decreased, while mining and quarrying, manufacturing, construction, railways, transportation, trade, hotel, restaurant, banking and insurance increased in the year 2007-08 over the year 2004-05.

Table 3.4: Percentage contribution of different sectors in Gross State Domestic Products at Current Rate (2004-05)

Particulars	2004 - 05	2005 - 06	2006 – 07	2007 – 08
Agriculture (including animal husbandry)	24.39	24.61	23.62	22.27
Forestry & logging	3.03	2.94	2.65	2.56
Fishing	0.25	0.22	0.23	0.20
Primary Sector	27.66	27.77	26.51	25.03
Mining & quarrying	4.83	4.68	4.30	4.92
Manufacturing – Registering	6.74	6.92	8.82	8.69
Manufacturing - Un Registering	4.38	4.28	4.26	4.36
Construction	8.26	8.67	7.99	9.25
Electricity, gas & water supply	2.95	2.63	3.17	1.95
Secondary Sector	27.15	27.17	28.55	29.17
Railways	1.76	1.58	1.84	1.72
Transport by other means & Storage	2.94	3.12	3.18	3.26
Communication	1.18	1.16	1.03	0.97
Trade, hotels and restaurants	13.59	13.18	13.63	13.97
Banking & Insurance	3.64	3.63	3.64	3.63
Real estate, ownership of dwellings and business services	8.18	8.52	8.41	9.02
Public administration	4.91	4.85	4.33	4.26
Other services	9.00	9.04	8.88	8.97
Tertiary Sector	45.19	45.07	44.95	45.81
Total	100.00	100.00	100.00	100.00

3.2 Changing structure of agriculture in Madhya Pradesh

The changing structure of Madhya Pradesh agriculture deals with the changing cropping pattern and production of different crops raised by the cultivators in the state in the year 2010-11 over the year 1990-91

3.2.1 Change in Cropping Pattern

The change in cropping pattern of Madhya Pradesh presented in table 3.5. it is observed from the data that gross cropped area of Madhya Pradesh has been found to be increased by 9.12 per cent in the year 2009 – 10 (20944 thousand ha) over the year 1999 – 2000 (19194 thousand ha). The area under total kharif crops (12.54%) was increased more as compared to Rabi crops (5.26%). The area under total pulses found to be increased by 23.26 per cent, while the area under cereal and oilseeds decreased by -6.78 per cent and -0.71 per cent during the period under study. Crop wise analysis shows that the highest area was found to be increased in maize (510.79%) followed by sesamum (163.50%), tur (106.43%), lentil (37.87%), pea (26.53%), soybean (25.05%), cotton (21.52%), rapeseed and mustard (16.13%), gram (12.16%) and sugarcane (11.63%). The area under paddy (-8.97%), jowar (- 36.50%), bajra (-74.87%), kodo – kutki (-45.85%), moong (-5.50%), kulthi (-51.22%), niger (-23.97%), linseed (-58.67%) and sunflower (-85.71%) were found to be decreased during the period under study.

Table 3.5:   Change in Cropping Pattern of M.P.

(000'ha)

Crops	1999-2000		2009-10		Absolute Change	Relative Change
	Area	% to GCA	Area	% to GCA		
Paddy	1740	9.07	1584	7.56	-156	-8.97
Jowar	674	3.51	428	2.04	-246	-36.50
Maize	139	0.72	849	4.05	710	510.79
Bajara	801	4.17	202	0.96	-599	-74.78
Kodo Kutki	458	2.39	248	1.18	-210	-45.85
Other Cereals	72	0.38	23	0.11	-49	-68.06
Kharif Cereals	**3884.00**	**20.24**	**3334.00**	15.92	-550	-14.16
Wheat	4669	24.33	4645	22.18	-24	-0.51
Barlay	85	0.44	77	0.37	-8	-9.41
Other Cereals	9	0.05	5	0.02	-4	-44.44
Total Rabi Cereals	**4763.00**	**24.82**	**4727.00**	22.57	-36	-0.76
Total Cereals	**8647**	45.05	**8061**	38.49	-586	-6.78
Tur	311	1.62	642	3.07	331	106.43
Urid	426	2.22	557	2.66	131	30.75
Mung	90	0.47	85	0.41	-5	-5.56
Kulthi	41	0.21	20	0.10	-21	-51.22
Other Pulses Kharif	4	0.02	4	0.02	0	0.00
Toal Pulses Kharif	**872**	**4.54**	**1308**	**6.25**	436	50.00
Gram	2575	13.42	2888	13.79	313	12.16
Pea	196	1.02	248	1.18	52	26.53
Lentil	507	2.64	699	3.34	192	37.87
Teora	63	0.33	53	0.25	-10	-15.87
Other Pulses Rabi	13	0.07	13	0.06	0	0.00
Total Pulses Rabi	**3354**	**17.47**	**3901**	**18.63**	**547**	**16.31**
TOTAL Pulses	**4226**	**22.02**	**5209**	**24.87**	**983**	**23.26**
Total Fodd grain kharif	**4756**	**24.78**	**4642**	**22.16**	**-114**	**-2.40**
Total food grain Rabi	**8117**	**42.29**	**8628**	**41.20**	**511**	**6.30**
Total food grain	**12873**	**67.07**	**13270**	**63.36**	**397**	**3.08**
Groundnut	224	1.17	204	0.97	-20	-8.93
Soybean	4440	23.13	5552	26.51	1112	25.05
Seasum	137	0.71	361	1.72	224	163.50
Niger	121	0.63	92	0.44	-29	-23.97
Other oilseed	4	0.02	0	0.00	-4	-100.00
Total Kharif oilseeds	**4926**	**25.66**	**4926**	**23.52**	**0**	**0.00**
Rape seed & Mustard	626	3.26	727	3.47	101	16.13
Linseed	231	1.20	95	0.45	-136	-58.87
Sun flower & others	7	0.04	1	0.00	-6	-85.71
Total Rabi oilseeds	**864**	**4.50**	**823**	**3.93**	**-41**	**-4.75**
Total oilseeds	**5790**	**30.17**	**5749**	**27.45**	**-41**	**-0.71**
Cotton	488	2.54	593	2.83	105	21.52
Sugarcane (G)	43	0.22	48	0.23	5	11.63
Total Kharif	**10170**	**52.99**	**11445**	**54.65**	**1275**	**12.54**
Total Rabi	**9024**	**47.01**	**9499**	**45.35**	**475**	**5.26**
Gross Cropped Area	**19194**	**100.00**	**20944**	**100.00**	**1750**	**9.12**

3.2.2 Change in Production

The total production of crops in Madhya Pradesh found to be increased by 14.33 per cent in the year 2009-10 (25399 thousand t) over the year 1999 – 2000 (22215 thousand t). The total production of Kharif crops (30.71%) showed higher relative change than in total Rabi crops (2.04%). The production of cereal (7.00%) and oilseeds (41.57%) found to be increased, while the

production of pulses decreased by 11.61 per cent. As regards to production of major crops the production of paddy (1.37%), jowar (13.23%), maize (5.51%), bajra (178.42%), wheat (6.22%), urad (60.90%), moong (6.90%), groundnut (37.39%), soybean (42.885), sesamum (474.19%), rapeseed & mustard (31.04%), cotton (140.28%) and sugarcane (3.16%) found to be increased, while the production of kodo – kutki (-35.94%), barley (-1.98%), tur (-24.07%), kulthi (-12.05%), gram (-10.615), pea (-33.00%), lentil (-26.28%), torea (-57.14%), niger (-22.22%), linseed (-64.57%), and sunflower (-100.00%) found to be decreased during the period.

Table 3.6:   Production of Crops in M.P (000't)

Crops	1999-2000		2009-10		Absolute Change	Relative Change
	Production	% to Total	Production	% to Total		
Paddy	1750	7.88	1774	6.98	24	1.37
Jowar	529	2.38	599	2.36	70	13.23
Maize	1270	5.72	1340	5.28	70	5.51
Bajara	139	0.63	387	1.52	248	178.42
Kodo Kutki	128	0.58	82	0.32	-46	-35.94
Other Cereals	26	0.12	9	0.04	-17	-65.38
Kharif Cereals	**3842.00**	**17.29**	**4191.00**	16.50	349	9.08
Wheat	8687	39.10	9227	36.33	540	6.22
Barlay	101	0.45	99	0.39	-2	-1.98
Other Cereals	7	0.03	5	0.02	-2	-28.57
Total Rabi Cereals	**8795.00**	**39.59**	**9331.00**	36.74	536	6.09
Total Cereals	**12637**	**56.88**	**13522**	53.24	885	7.00
Tur	270	1.22	205	0.81	-65	-24.07
Urid	133	0.60	214	0.84	81	60.90
Mung	29	0.13	31	0.12	2	6.90
Kulthi	8	0.04	7	0.03	-1	-12.50
Other Pulses Kharif	2	0.01	2	0.01	0	0.00
Toal Pulses Kharif	**442**	**1.99**	**459**	**1.81**	17	3.85
Gram	2536	11.42	2266	8.92	-270	-10.65
Pea	100	0.45	67	0.26	-33	-33.00
Lentil	274	1.23	202	0.80	-72	-26.28
Teora	70	0.32	30	0.12	-40	-57.14
Other Pulses Rabi	5	0.02	5	0.02	0	0.00
Total Pulses Rabi	**2985**	**13.44**	**2570**	**10.12**	**-415**	**-13.90**
TOTAL Pulses	**3427**	**15.43**	**3029**	**11.93**	**-398**	**-11.61**
Total Fodd grain kharif	**4284**	**19.28**	**4650**	**18.31**	**366**	**8.54**
Total food grain Rabi	**11780**	**53.03**	**11901**	**46.86**	**121**	**1.03**
Total food grain	**16064**	**72.31**	**16551**	**65.16**	**487**	**3.03**
Groundnut	222	1.00	305	1.20	83	37.39
Soybean	4743	21.35	6777	26.68	2034	42.88
Seasum	31	0.14	178	0.70	147	474.19
Niger	27	0.12	21	0.08	-6	-22.22
Other oilseed	2	0.01	0	0.00	-2	-100.00
Total Kharif oilseeds	**5025**	**22.62**	**7281**	**28.67**	**2256**	**44.90**
Rape seed & Mustard	625	2.81	819	3.22	194	31.04
Linseed	93	0.42	33	0.13	-60	-64.52
Sun flower & others	2	0.01	0	0.00	-2	-100.00
Total Rabi oilseeds	**720**	**3.24**	**852**	**3.35**	**132**	**18.33**
Total oilseeds	**5745**	**25.86**	**8133**	**32.02**	**2388**	**41.57**
Cotton	216	0.97	519	2.04	303	140.28
Sugarcane (G)	190	0.86	196	0.77	6	3.16
Total Kharif	**9525**	**42.88**	**12450**	**49.02**	**2925**	**30.71**
Total Rabi	**12690**	**57.12**	**12949**	**50.98**	**259**	**2.04**
Total Production	**22215**	**100.00**	**25399**	**100.00**	**3184**	**14.33**

3.3 Trends in area, production and productivity of selected crops:

The trends of area, production and yield of selected crops i.e. wheat, gram and tur for different districts of Madhya Pradesh has been analysed considering major districts, other districts and Madhya Pradesh and presented in this sub head.

3.3.1 Wheat

The area of wheat in Madhya Pradesh was found to be increased by 6.60 per cent in the current year (4159.37 thousand ha) over the base year (39012.69 thousand ha) with the fluctuation of 4.52 per cent and showed an annual growth of 0.74 per cent per year with the magnitude of 29.91 thousand ha (b) per year. The growth of wheat was found to be positive and significant in major wheat growing districts (2.61 %/year), while it was found negative in other districts (-0.45%/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of area was found to be positive in all the districts except Vidish (-2.15 % /year) district having negative and highly significant. The growth of wheat was found to be positive and highly significant in Hosangabad (3.79 %/year), Harda (6.15 % /Year), and Datia (6.13 %/ year), while it was found positive and significant in Dhar (6.15%/year), and Chhindwara (4.10 % /year) district (Table 3.7).

Table 3.7: Growth and variability in area of wheat in different districts of Madhya Pradesh

Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	b	Growth
Hosangabad	162.32	215.27	52.95	32.62	37.44	19.83	7.16***	3.79
Dhar	102.08	181.97	79.89	78.26	56.49	39.77	8.74*	6.15
Ujjain	94.03	157.67	63.64	67.68	45.00	35.76	4.75	3.78
Harda	82.97	119.53	36.56	44.07	25.85	25.53	5.02***	4.95
Vidisha	214.41	188.70	-25.71	-11.99	18.18	9.02	-4.33***	-2.15
Raisen	174.33	171.57	-2.76	-1.59	1.95	1.13	0.13	0.07
Sehore	126.37	160.17	33.79	26.74	23.90	16.68	3.54	2.47
Indore	87.77	105.63	17.86	20.35	12.63	13.06	0.57	0.59
Dewas	78.92	108.40	29.48	37.35	20.85	22.26	2.83	3.02
Ratlam	42.44	74.93	32.49	76.56	22.98	39.15	3.40	5.79
Chhindwara	75.17	99.83	24.66	32.80	17.44	19.93	3.59*	4.10
Morena	72.88	77.97	5.09	6.98	3.60	4.77	0.47	0.62
Datia	67.87	101.20	33.33	49.11	23.57	27.88	5.18***	6.13
Major wheat producing districts	**1381.56**	**1762.83**	**381.27**	**27.60**	**269.60**	**17.15**	**41.05***	**2.61**
Other district	**2520.13**	**2396.53**	**-123.60**	**-4.90**	**87.40**	**3.56**	**-11.13**	**-0.45**
MP	**3901.69**	**4159.37**	**257.68**	**6.60**	**182.20**	**4.52**	**29.91**	**0.74**
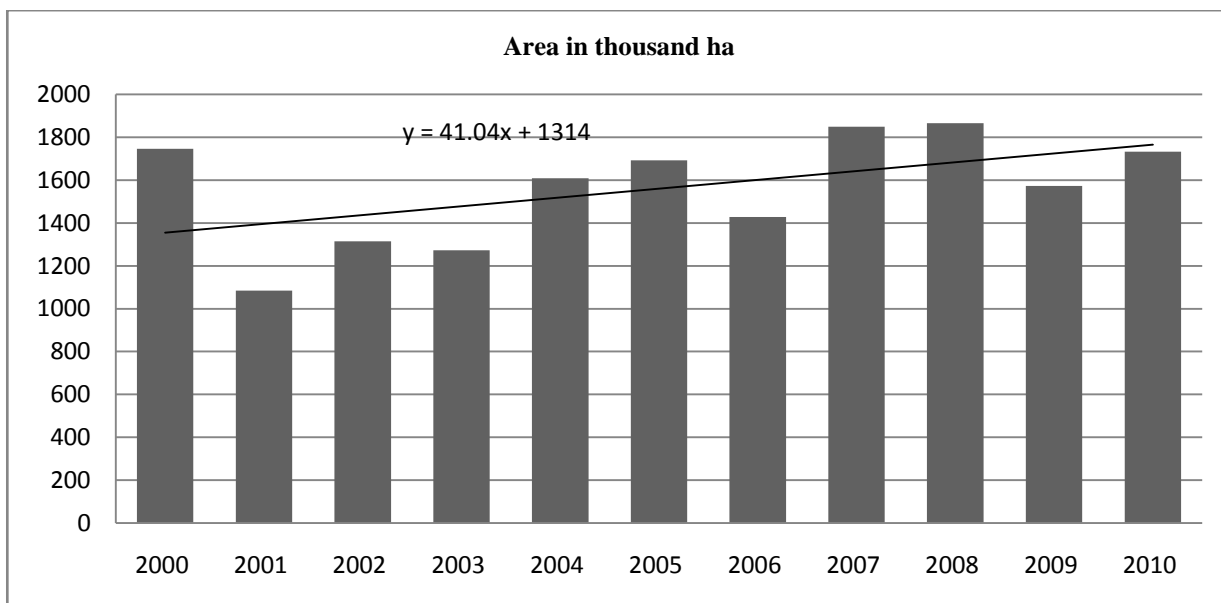
Fig. 3.1: Trend of area of wheat in major wheat growing district of Madhya Pradesh
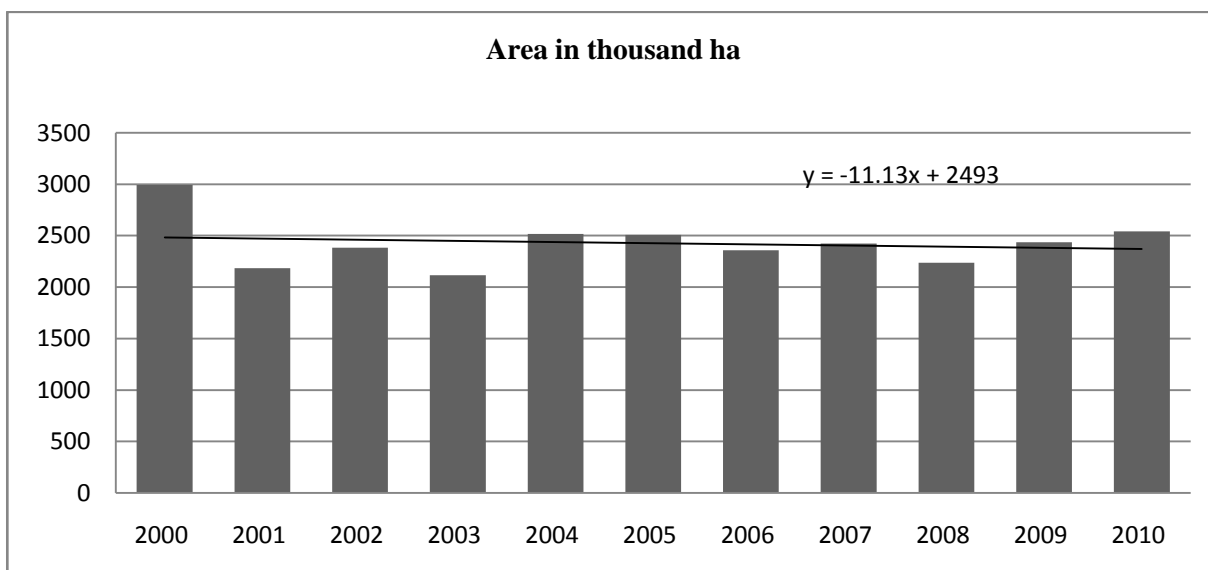
Fig. 3.2: Trend of area of wheat in other wheat growing district of Madhya Pradesh
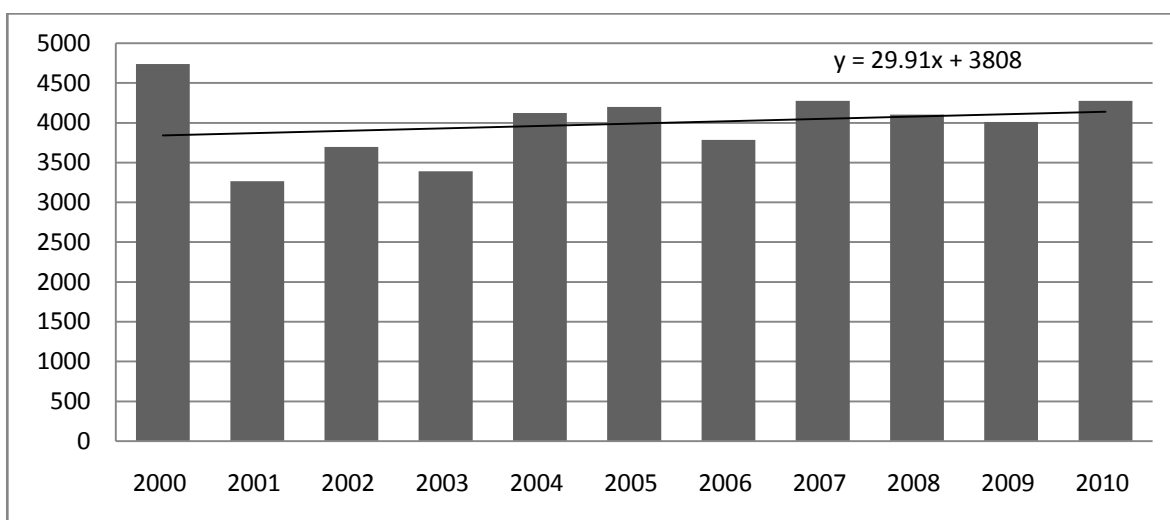
Fig. 3.3: Trend of area of wheat in Madhya Pradesh

The production of wheat in Madhya Pradesh was found to be increased by 28.84 per cent in the current year (7324.17 thousand t) over the base year (5684.65 thousand t) with the fluctuation of 17.82 per cent and showed an annual growth of 3.84 per cent per year with the magnitude of 249.97 thousand t per year. The growth of production of wheat was found to be positive and significant in major wheat growing districts (4.38 %/year) and also in other districts (3.31 %/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of production was found to be positive in all the districts except in Vidisha (-0.56 % /year) and Morena (-1.46 % /year) district. The growth of production of wheat was found to be positive and highly significant in Hosangabad (5.66 %/year) and Harda (11.93 % /Year), while it was positive and significant in Dhar (9.99% /year) (Table 3.8).

Table 3.8: Growth and variability in production of wheat in different districts of Madhya Pradesh

Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	b	Simple Growth rate
Hosangabad	424.50	624.90	200.40	47.21	141.70	27.01	29.68***	5.66
Dhar	151.40	411.87	260.47	172.04	184.18	65.40	28.12**	9.99
Ujjain	224.15	358.10	133.95	59.76	94.71	32.53	7.38	2.53
Harda	154.09	344.07	189.98	123.29	134.34	53.93	29.72***	11.93
Vidisha	310.27	272.60	-37.67	-12.14	26.64	9.14	-1.64	-0.56
Raisen	240.82	260.70	19.88	8.25	14.06	5.61	4.63	1.85
Sehore	246.39	259.83	13.44	5.45	9.50	3.75	2.01	0.79
Indore	162.09	237.10	75.01	46.28	53.04	26.57	4.27	2.14
Dewas	165.67	232.30	66.63	40.22	47.12	23.68	7.80	3.92
Ratlam	119.82	223.47	103.65	86.50	73.29	42.70	10.43	6.08
Chhindwara	150.19	199.20	49.01	32.63	34.66	19.84	16.95	9.70
Morena	203.95	188.83	-15.12	-7.41	10.69	5.44	-2.87	-1.46
Datia	172.58	183.47	10.88	6.31	7.70	4.32	6.23	3.50
Major wheat producing districts	**2725.93**	**3796.43**	**1070.51**	**39.27**	**756.96**	**23.21**	**142.70***	**4.38**
Other district	**2958.72**	**3527.73**	**569.01**	**19.23**	**402.35**	**12.41**	**107.27****	**3.31**
MP	**5684.65**	**7324.17**	**1639.52**	**28.84**	**1159.31**	**17.82**	**249.97***	**3.84**

Fig. 3.4: Trend of production of wheat in major wheat producing district of Madhya Pradesh

Fig. 3.5: Trend of production of wheat in other wheat producing district of Madhya Pradesh
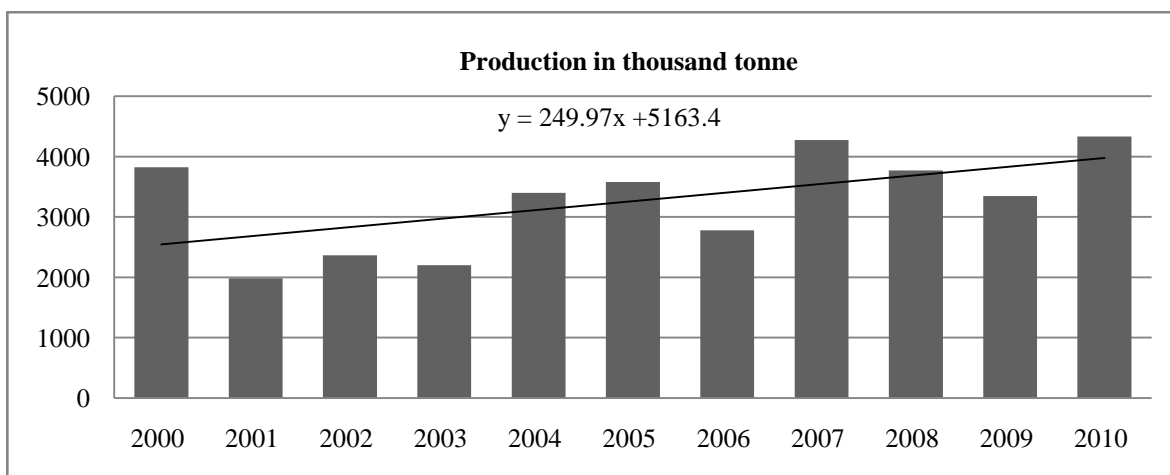
Fig. 3.6: Trend of production of wheat in Madhya Pradesh

The productivity of wheat in Madhya Pradesh was found to be increased by 8.85 per cent in the current year (1841.67 kg/ha) over the base year (1692.00 kg/ha) with the fluctuation of 5.99 per cent and showed an annual growth of 1.40 per cent per year with the magnitude of 24.80 kg/ha per year. The growth of productivity of wheat was found to be positive and significant in major wheat growing districts (2.29 %/year) and other districts (2.01 %/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of productivity was found to be positive in all the districts except in Sehore (-1.25 % /year) and Morena (-1.48 % /year). In Datia (-2.36% /year) district growth was negative and significant. The growth of productivity of wheat was found to be positive and highly significant in Hosangabad (2.44 %/year), Dhar (5.65% /year) and Harda (7.58 % /Year), while it was positive and significant in Raisen (2.27% /year) (Table 3.9).

Table 3.9: Growth and variability in yield of wheat in different districts of Madhya Pradesh

| Districts	The Base year	The Current Year	Absolute Change	Relative Change	SD	CV	b	Simple Growth rate
Hoshangabad	2613.33	3021.67	408.33	15.63	288.74	10.25	68.80**	2.44
Dhar	1393.33	2342.33	949.00	68.11	671.04	35.93	105.45***	5.65
Ujjain	1840.00	2308.00	468.00	25.43	330.93	15.96	44.34	2.14
Harda	1863.33	2985.33	1122.00	60.21	793.37	32.73	183.74***	7.58
Vidisha	1443.33	1491.00	47.67	3.30	33.71	2.30	33.14	2.26
Raisen	1380.00	1577.67	197.67	14.32	139.77	9.45	33.53*	2.27
Sehore	1973.33	1691.33	-282.00	-14.29	199.40	10.88	-22.87	-1.25
Indore	1770.00	2347.67	577.67	32.64	408.47	19.84	58.49	2.84
Dewas	1973.33	2246.67	273.33	13.85	193.28	9.16	46.01	2.18
Ratlam	2513.33	3116.00	602.67	23.98	426.15	15.14	65.17	2.32
Chhindwara	1850.00	2087.67	237.67	12.85	168.06	8.54	112.90	5.73
Morena	2796.67	2531.00	-265.67	-9.50	187.85	7.05	-39.40	-1.48
Datia	2540.00	1875.67	-664.33	-26.15	469.75	21.28	-52.10*	-2.36
Major wheat producing districts	**1996.15**	**2278.62**	**282.46**	**14.15**	**199.73**	**9.34**	**49.01****	**2.29**
Other district	**1356.49**	**1509.00**	**152.51**	**11.24**	**107.84**	**7.53**	**28.80***	**2.01**
MP	**1692.00**	**1841.67**	**149.67**	**8.85**	**105.83**	**5.99**	**24.80***	**1.40**
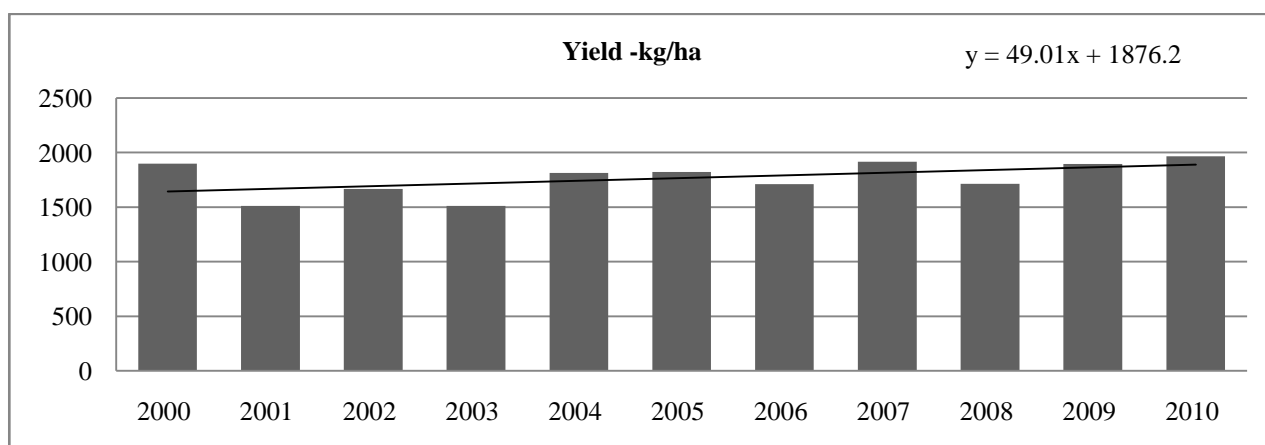
Fig. 3.7: Trend of yield of wheat in major wheat producing district of Madhya Pradesh
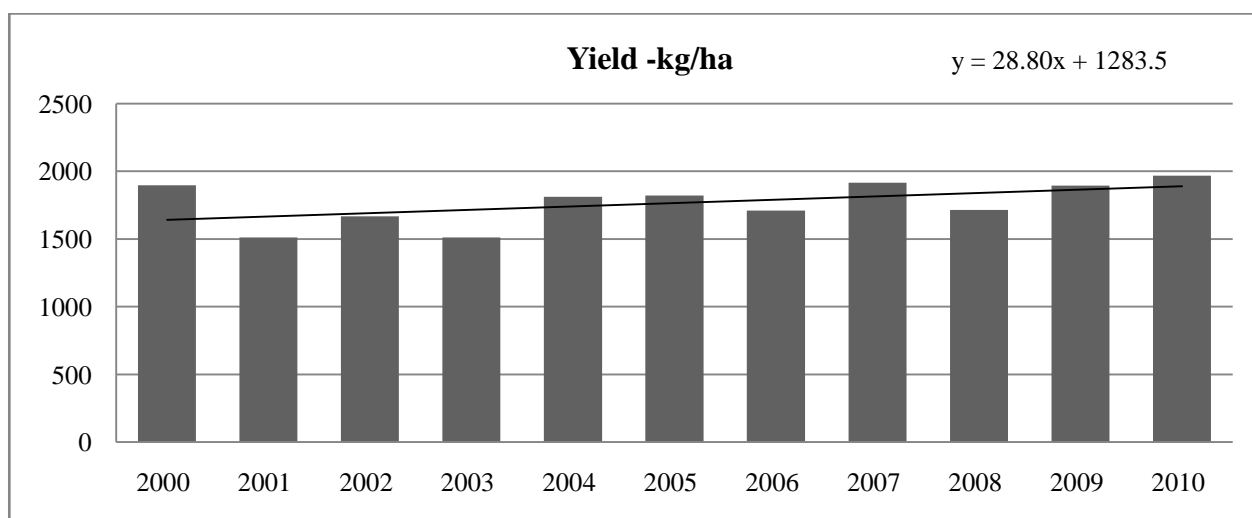
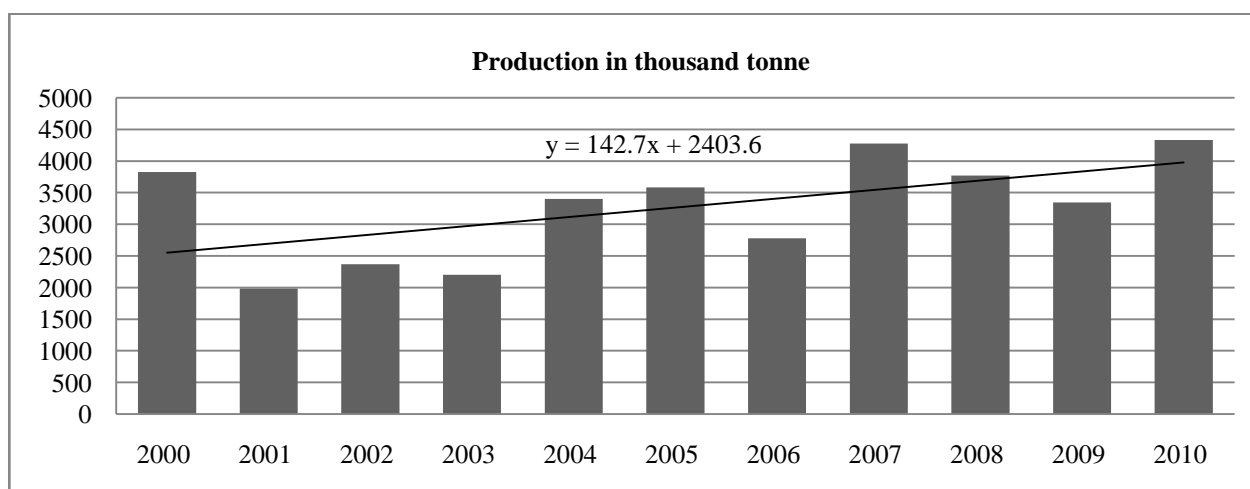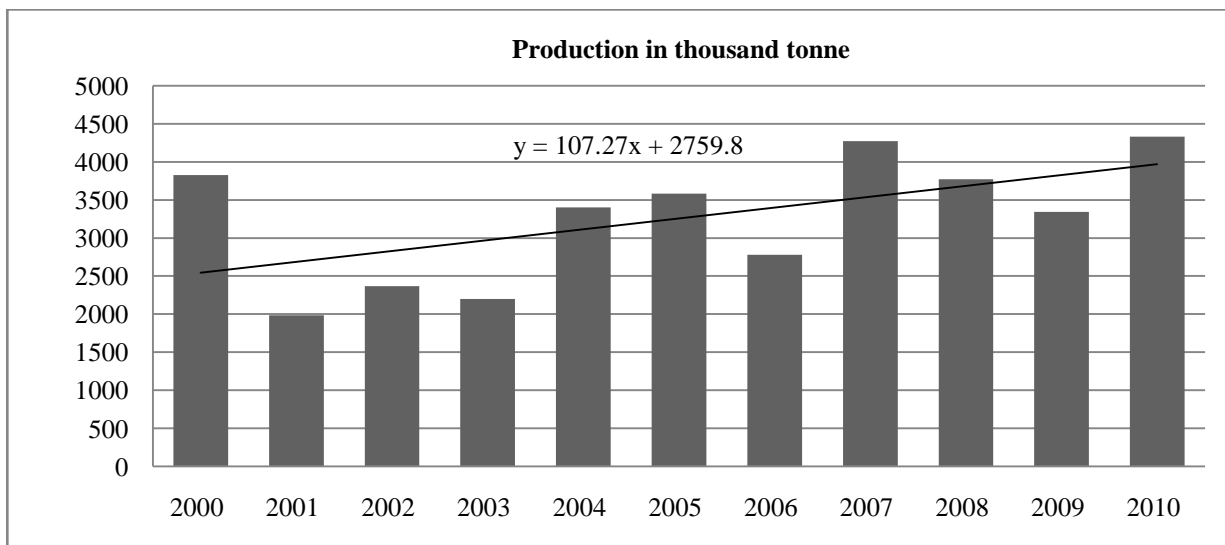**Fig. 3.8 Trend of yield of wheat in other wheat producing district of Madhya Pradesh**
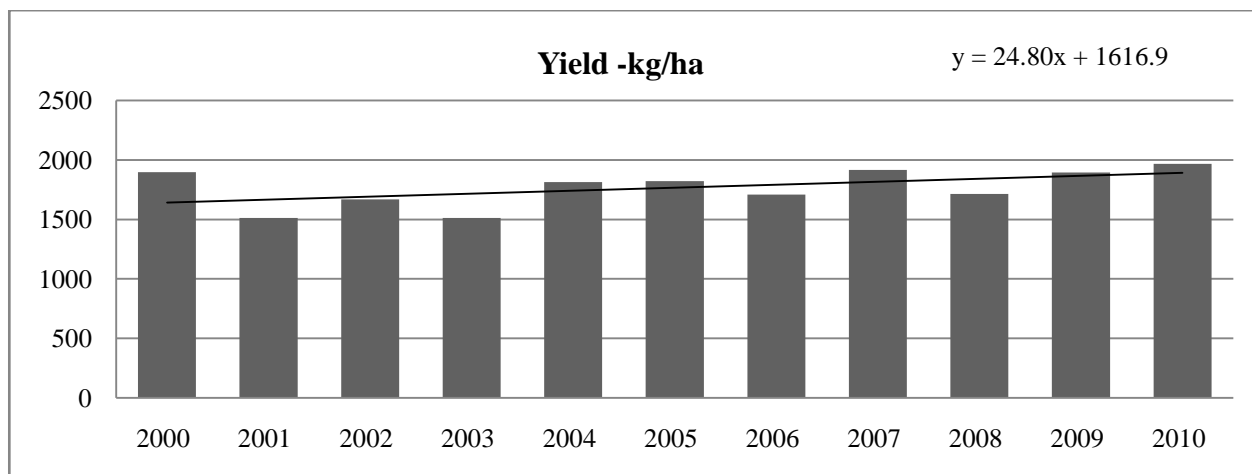
Fig. 3.9: Trend of yield of wheat in Madhya Pradesh

3.3.2 Gram

The area of Gram in Madhya Pradesh was found to be increased by 14.40 per cent in the current year (2938.47 thousand ha) over the base year (2568.50 thousand ha) with the fluctuation of 9.50 per cent and showed an annual growth of 2.17 per cent per year with the magnitude of 59.85 thousand ha per year. The growth of gram was found to be positive and highly significant in major gram growing districts (3.47 %/year), while it was found positive but non-significant in other districts (0.45%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of area was found to be positive in all the districts. The growth of wheat was found to be positive and highly significant in Vidisha (1.49 %/year), Raisen (3.23 % /Year), Dewas (7.74 %/ year), Panna (3.22 %/ year), and Sehore (6.14 %/ year), while it was positive and significant in Sagar (3.58% /year), Shajapur (6.76%/year), Jabalpur (2.66 % /year) and Damoh (4.56%/year) (Table 3.10).

Table 3.10: Growth and variability in Area of Gram in different districts of Madhya Pradesh

Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	B	Growth
Vidisha	192.38	213.63	21.25	11.05	15.03	7.40	3.03***	1.49
Narshingpur	128.41	134.90	6.49	5.05	4.59	3.49	0.41	0.31
Sagar	138.59	194.80	56.21	40.56	39.75	23.85	5.96*	3.58
Raisen	110.86	143.37	32.50	29.32	22.98	18.08	4.11***	3.23
Damoh	101.95	160.50	58.55	57.43	41.40	31.55	5.98**	4.56
Dewas	65.22	101.30	36.08	55.33	25.51	30.64	6.45***	7.74
Ujjain	94.03	138.83	44.80	47.65	31.68	27.21	7.95	6.83
Ashoknagar +guna	206.05	199.20	-6.85	-3.32	4.84	2.39	0.32	0.16
Shajapur	82.74	118.70	35.96	43.46	25.43	25.25	6.81*	6.76
Sehore	69.52	105.40	35.88	51.61	25.37	29.01	5.37***	6.14
Panna	73.49	92.10	18.61	25.32	13.16	15.89	2.67***	3.22
Rajgarh	61.90	82.47	20.57	33.23	14.54	20.15	3.69	5.11
Jabalpur	52.85	67.50	14.65	27.72	10.36	17.21	1.60**	2.66
Major Gram producing district	**1377.99**	**1752.70**	**374.71**	**27.19**	**264.96**	**16.93**	**54.34*****	**3.47**
Other district	**1190.51**	**1258.60**	**68.09**	**5.72**	**48.15**	**3.93**	**5.51**	**0.45**
MP	**2568.50**	**2938.47**	**369.97**	**14.40**	**261.61**	**9.50**	**59.85****	**2.17**
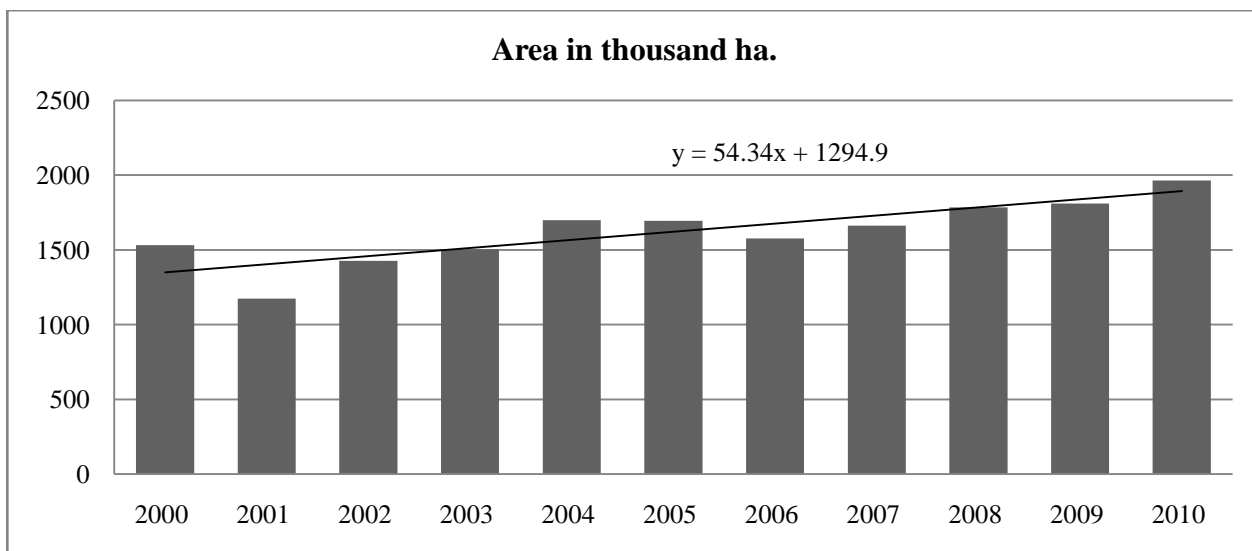
Fig. 3.10: Trend of area of gram in major wheat growing district of Madhya Pradesh

Fig. 3.11: Trend of area of gram in major wheat growing district of Madhya Pradesh
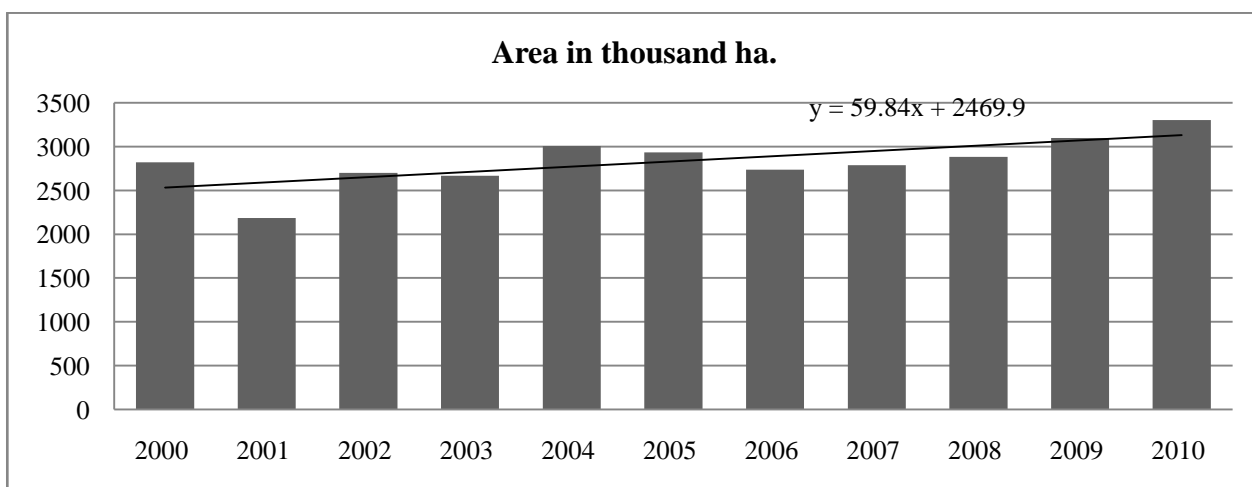
Fig. 3.12: Trend of area of gram in Madhya Pradesh

The production of Gram in Madhya Pradesh was found to be increased by 4.15 per cent in the current year (2440.13 thousand) over the base year (2342.94 thousand) with the fluctuation of 2.87 per cent and showed an annual growth of 2.35 per cent per year with the magnitude of 56.25 thousand per year. The growth of production of gram was found to be positive in major gram growing districts (3.65 %/year) and other districts (0.02%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of production was found to be positive in all the districts. The growth of gram was found to be positive and highly significant in Raisen (4.96 % /year), Damoh (9.02 %/ year), Dewas (9.57 %/ year), Sehore (6.39 %/ year), and Panna (9.58% /year), while it was positive and significant in Sagar (6.88% /year) (Table 3.11).

Table 3.11: Growth and variability in Production of Gram in different districts of Madhya Pradesh

Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	b	Growth
Vidisha	202.65	212.57	9.92	4.90	7.01	3.38	6.09	2.93
Narsinghpur	154.60	156.23	1.64	1.06	1.16	0.75	1.55	1.00
Sagar	102.07	150.50	48.43	47.45	34.25	27.12	8.69**	6.88
Raisen	114.23	150.33	36.11	31.61	25.53	19.30	6.56***	4.96
Damoh	78.35	136.60	58.25	74.34	41.19	38.32	9.69***	9.02
Dewas	68.10	120.33	52.23	76.70	36.94	39.20	9.02***	9.57
Ujjain	224.15	119.10	-105.05	-46.87	74.28	43.28	-13.37	-7.79
Ashoknagar+guna	181.25	172.17	-9.08	-5.01	6.42	3.63	4.35	2.46
Shajapur	76.31	97.67	21.36	27.99	15.10	17.36	6.94	7.98
Sehore	69.50	97.33	27.83	40.05	19.68	23.59	5.33***	6.39
Panna	45.09	77.70	32.61	72.32	23.06	37.56	5.88***	9.58
Rajgarh	63.86	76.30	12.44	19.47	8.79	12.55	3.38	4.82
Jabalpur	52.50	66.63	14.14	26.93	10.00	16.78	1.92	3.23
Major Gram producing districts	**1432.65**	**1633.47**	**200.82**	**14.02**	**142.00**	**9.26**	**56.03**	**3.65**
Other district	**910.29**	**872.43**	**-37.86**	**-4.16**	**26.77**	**3.00**	**0.22**	**0.02**
MP	**2342.94**	**2440.13**	**97.20**	**4.15**	**68.73**	**2.87**	**56.25**	**2.35**

Fig. 3.13: Trend of production of gram in major gram producing district of Madhya Pradesh
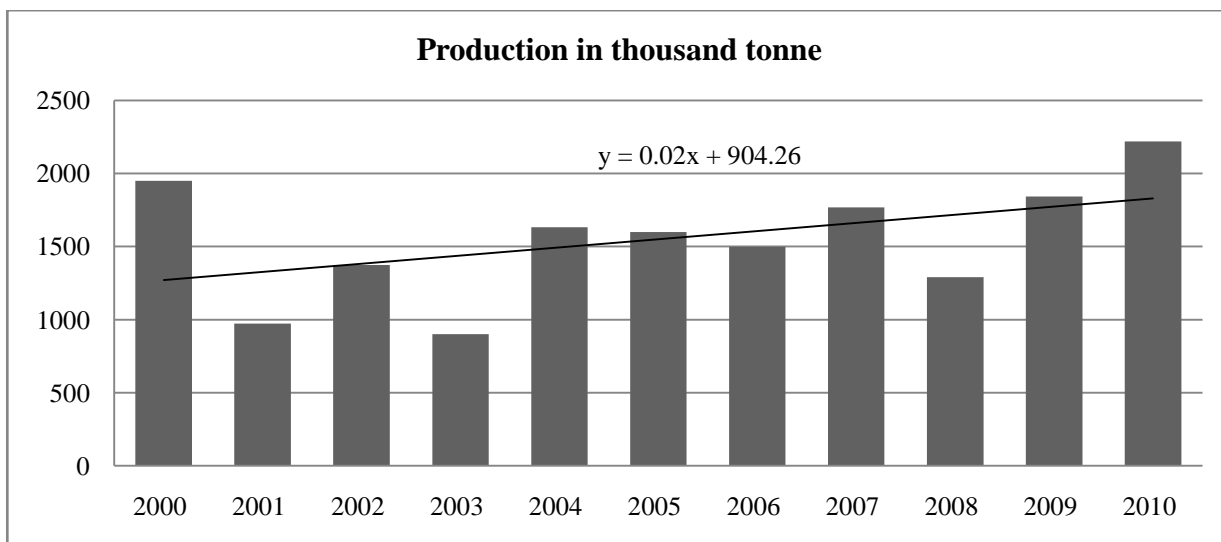
Fig. 3.14: Trend of production of gram in other gram producing district of Madhya Pradesh

Fig. 3.15: Trend of production of gram in Madhya Pradesh

The productivity of gram in Madhya Pradesh was found to be decreased by -0.22 per cent in the current year (874.75kg/ha) over the base year (876.70 kg/ha) with the fluctuation of 0.16 per cent and showed an annual growth of 0.93 per cent per year with the magnitude of 8.15 kg/ha per year. The growth of productivity of gram was found to be positive in major gram growing districts (1.47 %/year) and other districts (0.30%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of productivity was found to be positive in all the districts except Ujjain (-2,08% /year) and Sehore (0.01% /year). The growth in productivity of gram was found to be positive and highly significant in Panna (6.09 % /year) district, while it was positive and significant in Dewas district (2.22% /year) (Table 3.12).

Table 3.12: Growth and variability in yield of Gram in different districts of Madhya Pradesh

Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	b	Growth
Vidisha	1056.67	1000.33	-56.33	-5.33	39.83	3.87	13.49	1.31
Narshingpur	1203.33	1158.33	-45.00	-3.74	31.82	2.69	7.05	0.60
Sagar	736.67	771.00	34.33	4.66	24.28	3.22	19.79	2.63
Raisen	1026.67	1052.00	25.33	2.47	17.91	1.72	16.88	1.62
Damoh	776.67	849.67	73.00	9.40	51.62	6.35	29.57	3.64
Dewas	1006.67	1201.67	195.00	19.37	137.89	12.49	24.48**	2.22
Ujjain	961.00	874.33	-86.67	-9.02	61.28	6.68	-19.06	-2.08
Ashoknagar +guna	876.67	873.00	-3.67	-0.42	2.59	0.30	19.88	2.27
Shajapur	833.33	847.67	14.33	1.72	10.14	1.21	16.06	1.91
Sehore	1000.00	938.00	-62.00	-6.20	43.84	4.52	-0.08	-0.01
Panna	610.00	841.33	231.33	37.92	163.58	22.54	44.23***	6.09
Rajgarh	953.33	935.67	-17.67	-1.85	12.49	1.32	3.16	0.33
Jabalpur	993.33	989.00	-4.33	-0.44	3.06	0.31	4.22	0.43
Major Gram producing district	**925.72**	**948.62**	**22.90**	**2.47**	**16.19**	**1.73**	**13.82**	**1.47**
Other district	**827.68**	**800.89**	**-26.78**	**-3.24**	**18.94**	**2.33**	**2.47**	**0.30**
MP	**876.70**	**874.75**	**-1.94**	**-0.22**	**1.37**	**0.16**	**8.15**	**0.93**
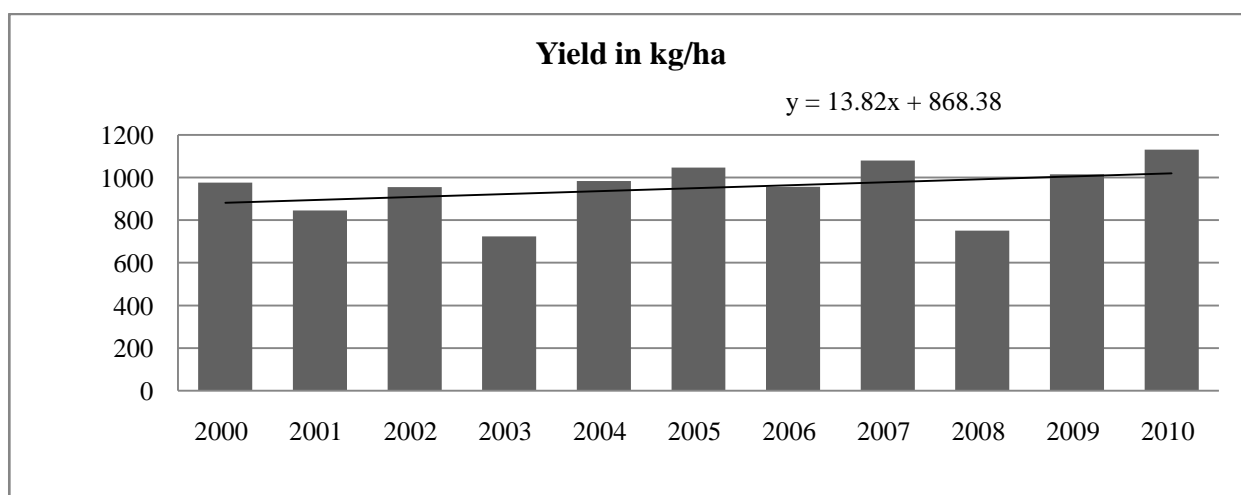
Fig. 3.16: Trend of yield of gram in major gram producing district of Madhya Pradesh
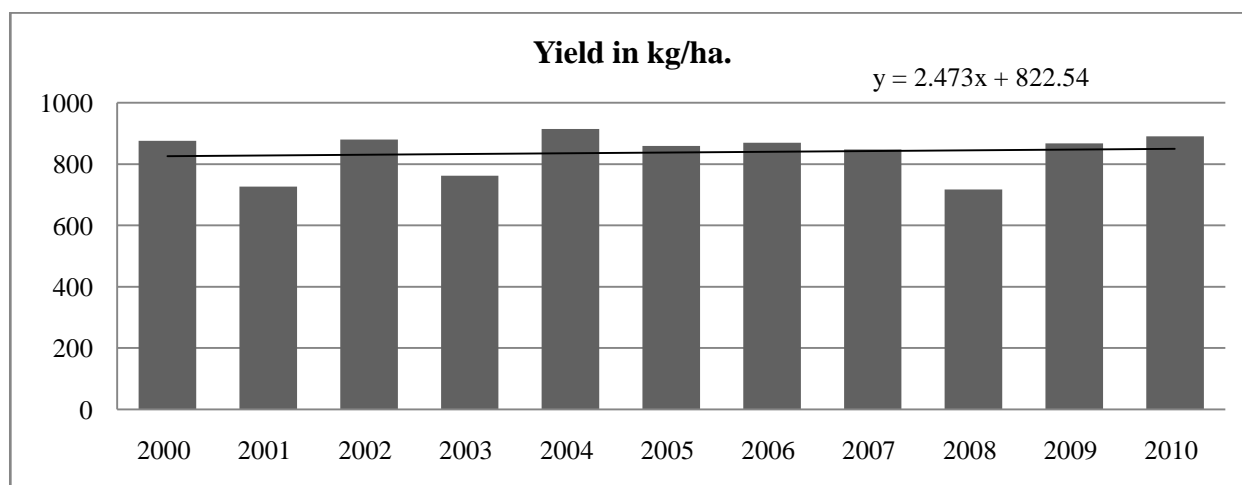
Fig. 3.17: Trend of yield of gram in other gram producing district of Madhya Pradesh
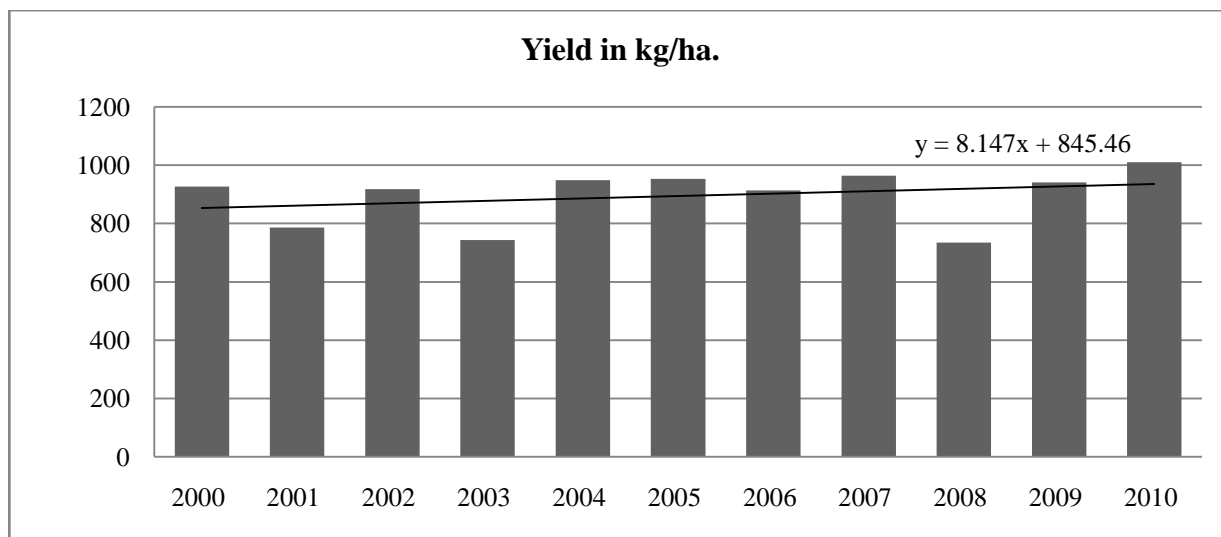
Fig. 3.18: Trend of yield of gram in Madhya Pradesh

3.3.3 Tur

The area of tur in Madhya Pradesh was found to be increased by 3.46 per cent in the current year (320.70 thousand ha) over the base year (309.97 thousand ha) with the fluctuation of 2.41 per cent and showed an annual growth of 0.70 per cent per year with the magnitude of 2.21 thousand ha per year. The growth of area of tur was found to be positive and highly significant in major tur growing districts (1.62 %/year), while it was found negative and significant in other districts (-0.78%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of area of tur was found to be positive in all the districts except in Chhindwara (-2.06% /year), Khandwa (-5.66% /year), Hosangabad (-3.57% /year), and Khargone (-1.60% /year) districts where it was found negative and significant. The growth of area of tur was found to be positive and highly significant in Narshingpur (8.64 %/year), Betul (5.85% /year), Jabalpur (5.99% /year), Seoni (1.93% /year), Rewa (1.48% /year) and Satna (2.33% /year) districts (Table 3.13).

Table 3.13: Growth and variability in area of tur in different districts of Madhya Pradesh

Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	b	Growth
NARSINGHPUR	14.79	25.40	10.61	71.71	7.50	37.33	1.74***	8.64
CHHINDWARA	23.05	18.43	-4.61	-20.01	3.26	15.72	-0.43**	-2.06
BETUL	16.42	25.63	9.22	56.14	6.52	31.00	1.23***	5.85
RAISEN	22.73	19.37	-3.36	-14.79	2.38	11.30	0.78	3.72
SIDHI + SINGROLI	138.38	134.07	-4.31	-3.12	3.05	2.24	0.76	0.56
KHANDWA	14.34	9.10	-5.24	-36.55	3.71	31.63	-0.66***	-5.66
JABALPUR	4.98	7.03	2.06	41.30	1.45	24.20	0.36**	5.99
HOSHANGABAD	10.48	7.53	-2.95	-28.13	2.09	23.15	-0.32*	-3.57
KHARGONE	16.06	14.27	-1.79	-11.15	1.27	8.35	-0.24***	-1.60
SEONI	5.53	6.53	1.01	18.18	0.71	11.78	0.12*	1.93
REWA	11.52	13.63	2.11	18.30	1.49	11.86	0.19**	1.48
SATNA	13.15	13.80	0.65	4.93	0.46	3.40	0.31*	2.33
Major tur producing district	**184.74**	**204.47**	**19.72**	**10.68**	**13.95**	**7.17**	**3.15****	**1.62**
Other district	**125.23**	**116.23**	**-8.99**	**-7.18**	**6.36**	**5.27**	**-0.94***	**-0.78**
MP	**309.97**	**320.70**	**10.73**	**3.46**	**7.59**	**2.41**	**2.21**	**0.70**
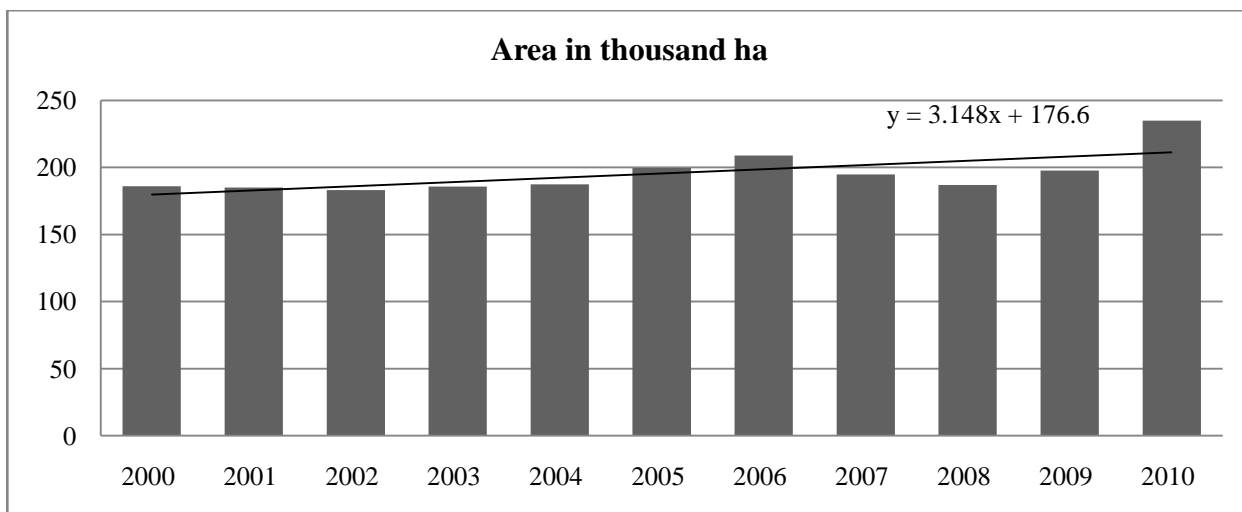
Fig. 3.19: Trend of area of tur in major tur growing district of Madhya Pradesh
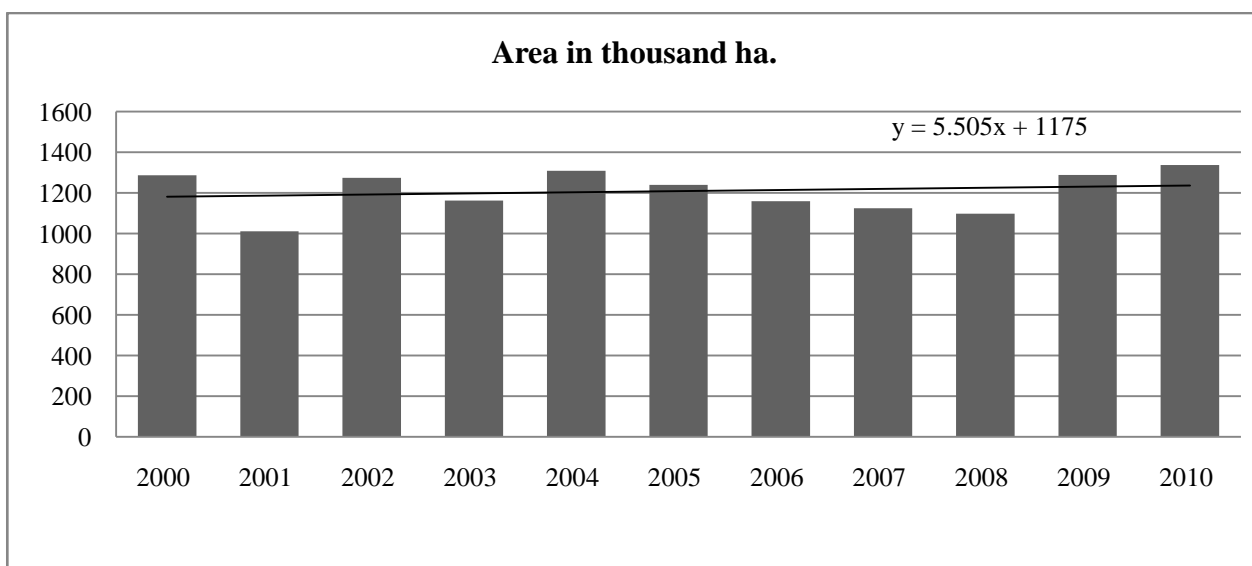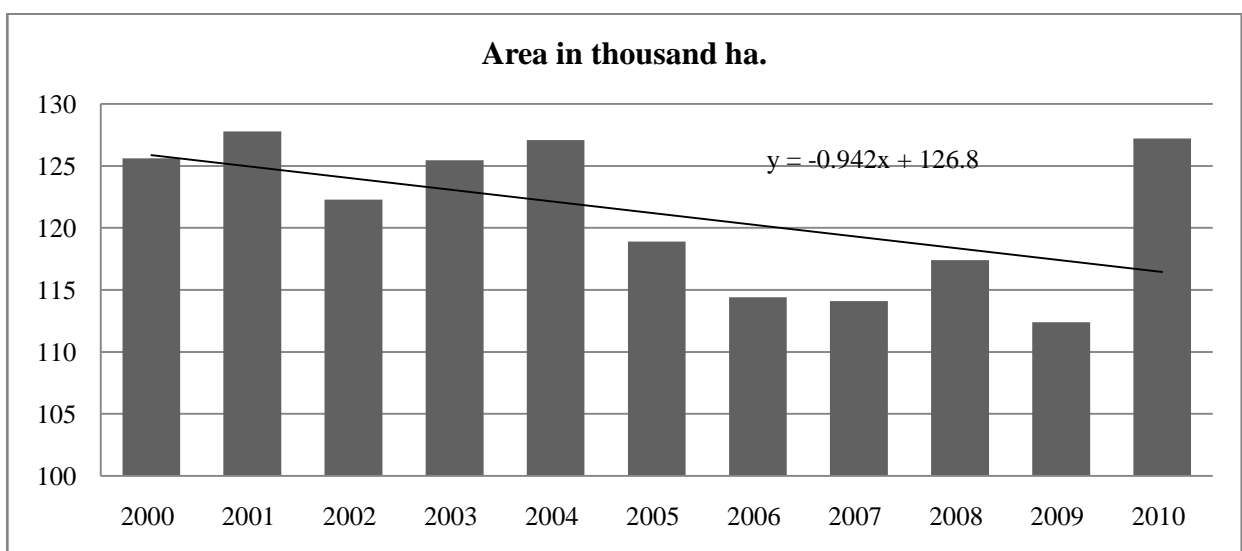

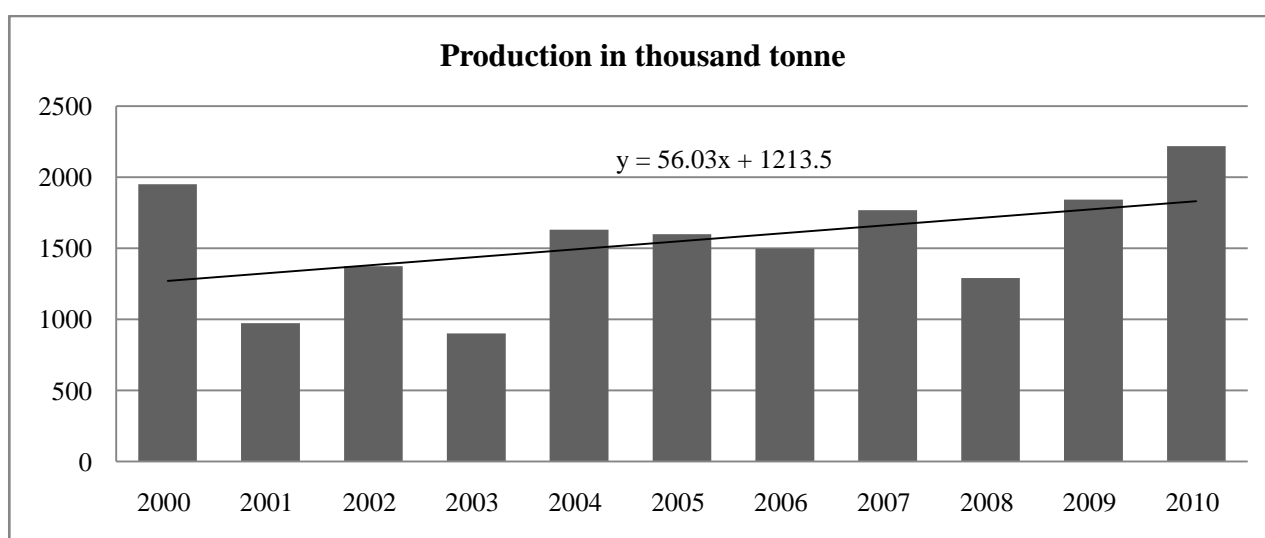**Fig. 3.20: Trend of area of tur in other tur growing district of Madhya Pradesh**
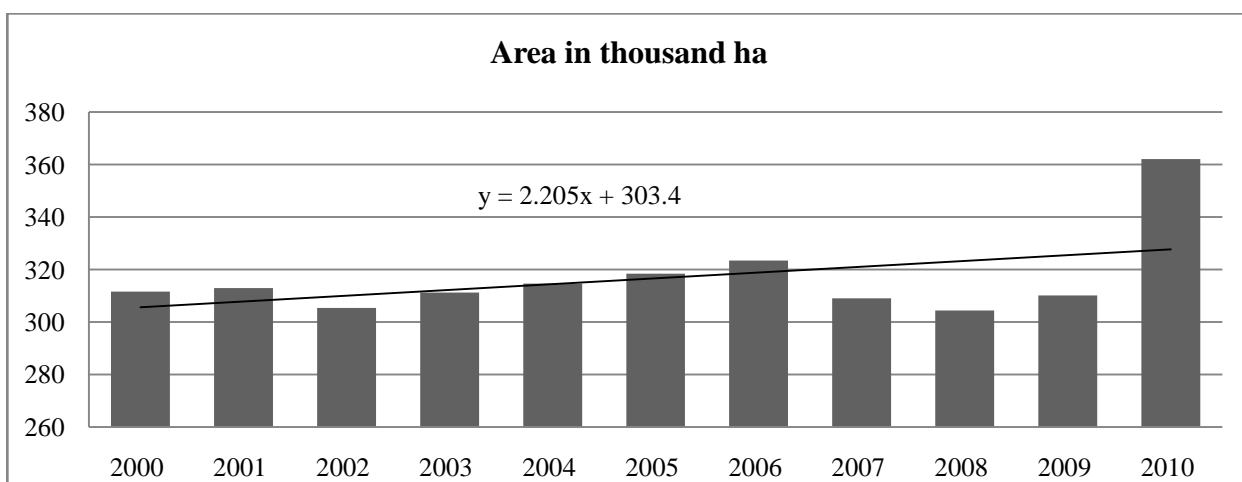
Fig. 3.21: Trend of area of tur in Madhya Pradesh

The production of tur in Madhya Pradesh was found to be decreased by -8.95 per cent in the current year (219.37 thousand t) over the base year (240.92 thousand t) with the fluctuation of 6.62 per cent and yet showed a positive annual growth of 0.79 per cent per year with the magnitude of 1.82 thousand t per year.

Table 3.14: Growth and variability in Production of tur in different districts of Madhya Pradesh

Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	b	Growth
Narshingpur	23.77	32.20	8.43	35.48	5.96	21.31	1.98***	7.08
Chhindwara	29.99	28.43	-1.56	-5.20	1.10	3.77	0.22	0.75
Betul	12.26	17.77	5.51	44.92	3.89	25.94	0.95**	6.33
Raisen	18.27	12.00	-6.27	-34.33	4.44	29.30	0.15	1.01
Sidhi+singroli	16.33	13.97	-2.36	-14.48	1.67	11.04	-0.40	-2.63
Khandwa	13.26	9.40	-3.86	-29.13	2.73	24.11	-0.46**	-4.03
Jabalpur	6.56	8.20	1.64	24.99	1.16	15.71	0.40	5.44
Hosangabad	13.35	7.63	-5.71	-42.80	4.04	38.51	-0.58**	-5.54
Khargone	7.69	6.73	-0.96	-12.48	0.68	9.41	-0.12	-1.63
Seoni	5.44	6.53	1.10	20.16	0.78	12.95	0.17	2.83
Rewa	6.84	6.27	-0.58	-8.44	0.41	6.23	0.00	0.06
Satna	7.47	4.90	-2.57	-34.45	1.82	29.42	-0.08	-1.26
Major Tur producing district	161.24	154.03	-7.21	-4.47	5.10	3.23	2.25	1.42
Other district	79.68	65.33	-14.34	-18.00	10.14	13.99	-0.42	-0.58
MP	240.92	219.37	-21.55	-8.95	15.24	6.62	1.82	0.79

The growth of production of tur was found to be positive in major tur growing districts (1.42 %/year), while it was found negative and non-significant in other districts (-0.58%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of production was found to be positive in all the districts except in Sidhi (-2.63% /year), Khandwa (-4.03% /year) and Hosangabad (-5.54% /year) where it was found negative and significant. The growth of production of tur was found to be positive and highly significant in Narshingpur (7.08 %/year) district, while it was positive and significant in Betul (6.33% /year) district (Table 3.14).
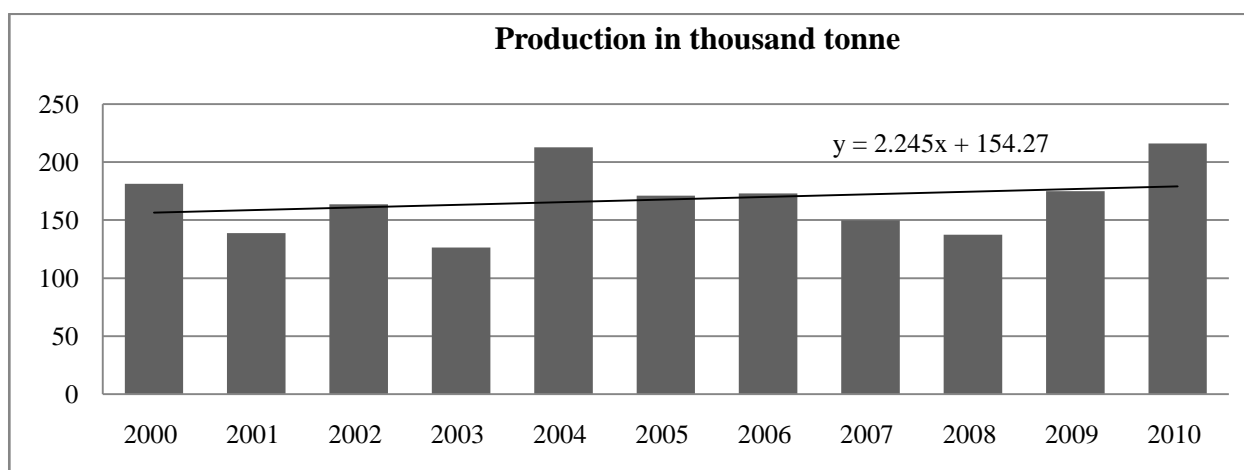
Fig. 3.22: Trend of production of tur in major tur producing district of Madhya Pradesh

Production in thousand tonne

y = -0.421x + 76.88
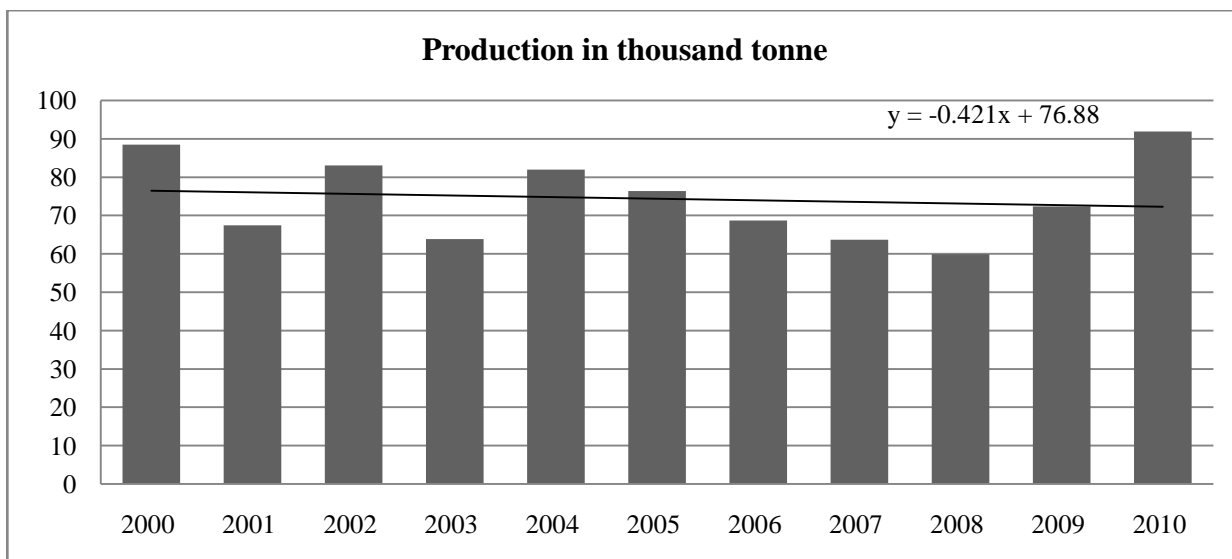
Fig. 3.23: Trend of production of tur in other tur producing district of Madhya Pradesh
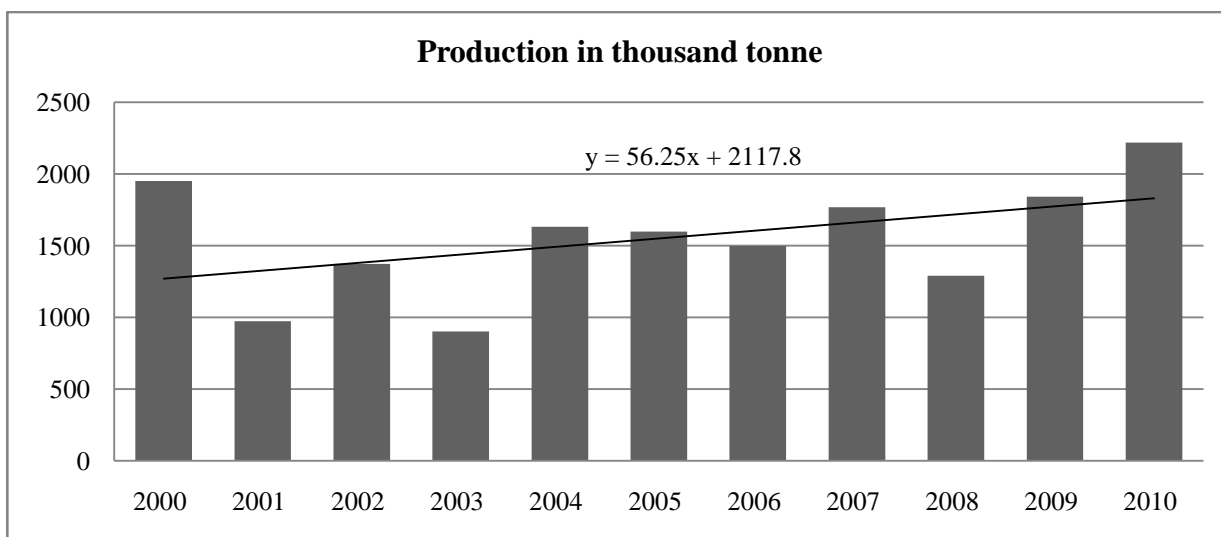

y = 1.823x + 231.15

Fig. 3.24: Trend of production of tur in Madhya Pradesh

The productivity of tur in Madhya Pradesh was found to be decreased by -13.61 per cent in the current year (698.44 kg/ha) over the base year (808.43 kg/ha) with the fluctuation of 10.32 per cent and showed an annual growth of -0.66 per cent per year with the magnitude of -5.01 kg/ha per year. The growth of productivity of tur was found to be negative in major tur growing districts (-0.31 %/year) and also in other districts (-1.17%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of productivity was found to be negative in all the districts except Chhindwara (2.82% /year), Betul (0.14% /year), Khandwa (1.79% /year) and Seoni (1.10% /year). The growth of productivity of tur was found to be positive and highly significant in Chhindwara (2.82 %/year), while it was found negative and significant in Raisen (-2.73% /year), Hosangabad (-1.95% /year) and Satna (-3.74% /year) districts (Table 3.15).

Table 3.15: Growth and variability in yield of Tur in different districts of Madhya Pradesh

| Districts	The Base year	The Current year	Absolute Change	Relative Change	SD	CV	b	Growth
Narsinghpur	1603.33	1263.67	-339.67	-21.19	240.18	16.75	-23.95	-1.67
Chhindwara	1290.00	1541.33	251.33	19.48	177.72	12.55	39.93*	2.82
Betul	746.67	694.00	-52.67	-7.05	37.24	5.17	0.97	0.14
Raisen	806.67	611.67	-195.00	-24.17	137.89	19.44	-19.39*	-2.73
Sidhi+singroli	516.67	429.67	-87.00	-16.84	61.52	13.00	-3.51	-0.74
Khandwa	923.33	1033.33	110.00	11.91	77.78	7.95	17.55*	1.79
Jabalpur	1316.67	1156.00	-160.67	-12.20	113.61	9.19	-7.86	-0.64
Hoshangabad	1270.00	1013.33	-256.67	-20.21	181.49	15.90	-22.24*	-1.95
Khargone	480.00	473.67	-6.33	-1.32	4.48	0.94	-0.08	-0.02
Seoni	960.00	999.67	39.67	4.13	28.05	2.86	10.82	1.10
Rewa	593.33	461.33	-132.00	-22.25	93.34	17.70	-7.35	-1.39
Satna	573.33	354.67	-218.67	-38.14	154.62	33.32	-17.36*	-3.74
Major Tur producing district	**923.33**	**836.03**	**-87.31**	**-9.46**	**61.73**	**7.02**	**-2.71**	**-0.31**
Other district	**693.54**	**560.86**	**-132.68**	**-19.13**	**93.82**	**14.96**	**-7.31**	**-1.17**
MP	**808.43**	**698.44**	**-109.99**	**-13.61**	**77.78**	**10.32**	**-5.01**	**-0.66**
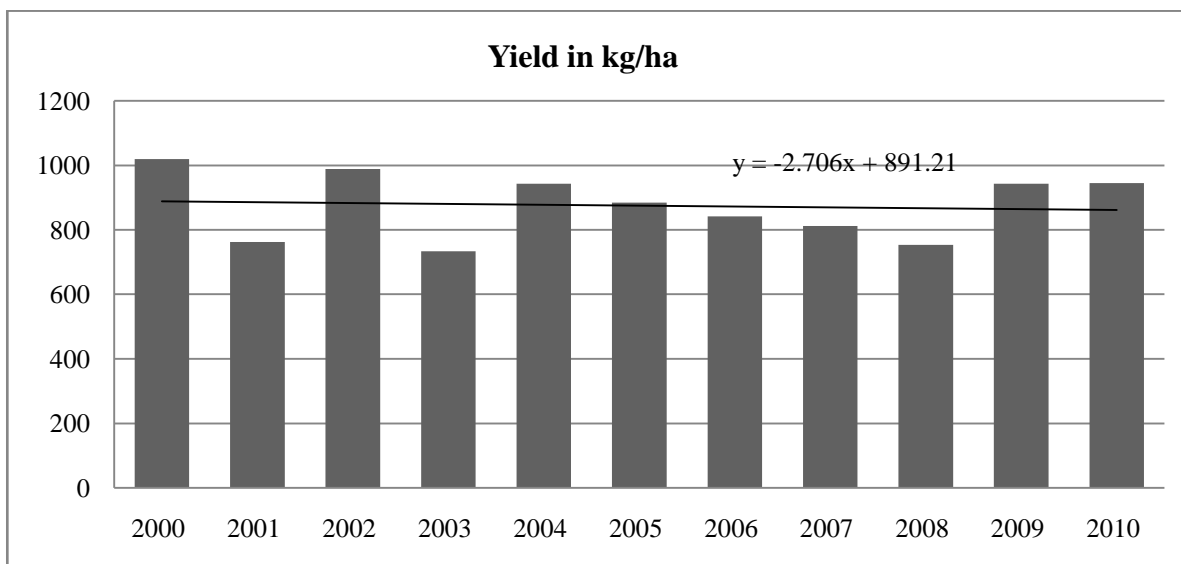
Fig. 3.25: Trend of yield of tur in major tur growing district of Madhya Pradesh
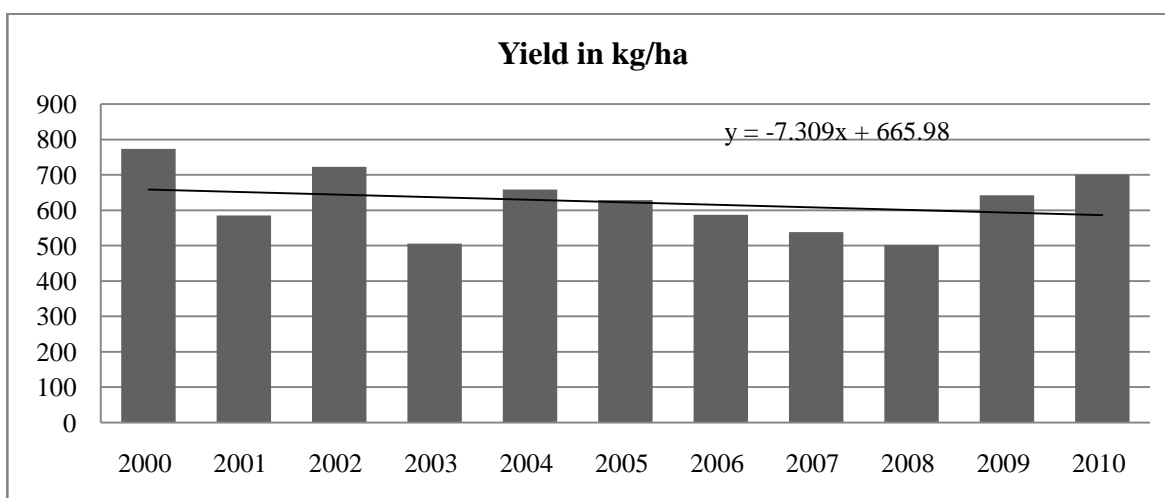
**Fig. 3.26: Trend of yield of tur in other tur producing district of Madhya Pradesh**

58
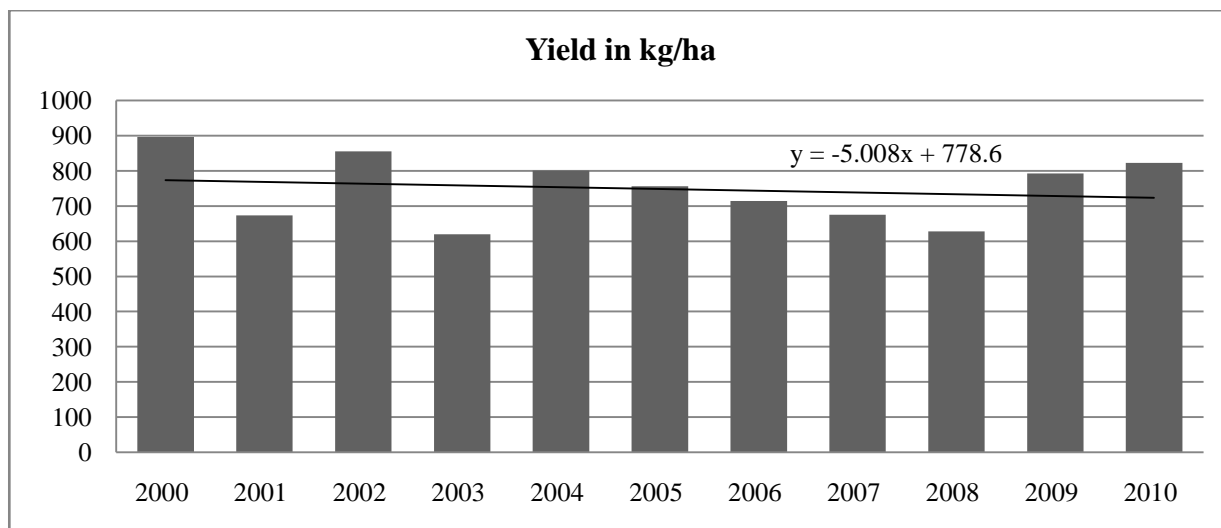
Fig. 3.27: Trend of yield of tur in Madhya Pradesh

3.4 Marketed surplus ratio of selected crops

The marketed surplus ratio of selected crops i.e. wheat, gram and tur was also analysed for Madhya Pradesh state and presented in table 3.16. It is observed from the data that the production marketed ratio of all the crops showed increasing trend during the period 2001-02 to 2009–10. In case of wheat production marketed surplus ratio was found to be increased from 1:0.33 to 1:0.69 revealed that the marketed surplus of wheat increased from 33 per cent (2001-02) to 69 per cent (2009 - 10). The marketed surplus ratio of gram and tur was also found to be increased from 1:0.41 (2001 - 02) to 1:0.56 (2009 - 10) and 1:0.43 (2001 - 02) to 1:0.48 (2009 -10) respectively.

Table 3.16: Marketed surplus ratio of selected crops in Madhya Pradesh

Years	Wheat			Gram			Tur		
	Production	Marketed surplus	Marketed ratio	Production	Marketed surplus	Marketed ratio	Production	Marketed surplus	Marketed ratio
2001-02	6034.06	1997.60	0.33	2415.78	979.67	0.41	250.63	108.26	0.43
2002-03	4968.42	2587.90	0.52	1744.26	1544.89	0.89	194.24	95.28	0.49
2003-04	7486.88	3253.81	0.43	2715.98	1477.52	0.54	298.66	110.56	0.37
2004-05	7327.40	4718.10	0.64	2549.10	1696.75	0.67	247.60	141.21	0.57
2005-06	6199.70	4946.37	0.80	2377.90	1486.90	0.63	241.70	156.48	0.65
2006-07	7847.80	4100.50	0.52	2556.70	1180.08	0.46	213.50	113.58	0.53
2007-08	6736.70	5754.72	0.85	1925.80	1392.10	0.72	197.20	100.66	0.51
2008-09	7279.60	5848.07	0.80	2814.70	1743.38	0.62	247.40	180.05	0.73
2009-10	8410.00	5800.20	0.69	3304.10	1861.07	0.56	308.00	148.63	0.48

3.5 Trend in consumption of major inputs and services

Change in consumption of major inputs i.e. area under HYVs, fertilizer consumption, irrigated area and services viz. storage and ware housing facilities, consumption of electricity, road length, and numbers of Kisan Credit Cards were analysed and presented in table 3.17. It is observed from the data that area under HYVs of all the crops has been found to be increased by 22.47 per cent in the year 2009-10 over the year 1999-2000 expect for jowar (-25.18%). The

increase in maximum area under HYVs has been noted for bajra (63.10%) followed by paddy (50.42%) maize (36.99%) and wheat (19.12).

Table 3.17:   Change in consumption of major inputs and services

Particulars	2001	2010	Absolute Change	Relative Change
High Yielding Varieties Area (000'ha))				
High Yielding Varieties Area	5372.7	6580	1207.30	22.47
Paddy	944	1420	476.00	50.42
Jowar	534.6	400	-134.60	-25.18
Maize	438	600	162.00	36.99
Barjra	98.1	160	61.90	63.10
Wheat	3358	4000	642.00	19.12
Fertilizer Consumption (000't)				
N	527.1	941.8	414.70	78.68
P	372.2	605.8	233.60	62.76
K	44.2	113.7	69.50	157.24
Total	943.5	1667.1	723.60	76.69
Irrigated Area (000'ha)				
Canal	1002	1066	64.00	6.39
Tank	132	130	-2.00	-1.52
Tube well + Well	3712.0	4369	657.00	17.70
Other sources	815	941	126.00	15.46
Total	5661	6506	845.00	14.93
Storage and warehouse facilities (000't)				
Total capacity		20.51	20.51	
Capacity utilization		16.88	16.88	
Crop Insurance				
Number (lacs)		2.05	2.05	
Payment (Rs. Crores)		186.33	186.33	
Others				
Electricity production (million unit)	13298	17750	4452.00	33.48
Road Length (KM)	68105	91968	23863.00	35.04
Kisan Credit Cards (Numbers)	0	632859		

The fertilizer consumption was also found to be increased by 76.69 per cent in the year 2010 over the year 2001. Amongst different types of fertilizer the consumption of potasik fertilizer showed maximum percentage change (157.14%) over nitrogen (78.68%) and phosphoric fertilizer (62.76%).

The irrigation facilities in Madhya Pradesh have also been increased by 14.93 per cent in the year 2010 over the year 2001. Irrigated area by canal, tube well and wells, other sources has been found to be increased 6.39 per cent, 17.70 per cent and 15.46 per cent respectively, while, the area irrigated by tanks found to be decreased by -1.52 per cent in the year 2010 over the year 2001. The electricity production and road of length has also been increased by 33.48 per cent and 35.04 per cent in the year 2010 over the year 2001.

CHAPTER IV

MARKETABLE AND MARKETED SURPLUS

This chapter deals with the main features of sample households, estimation of crop losses at different stages, marketable and marketed ratio and factors affecting marketed surplus of wheat, gram and Tur derived from the analysis of primary data collected from different selected districts of the study area in Madhya Pradesh.

4.1 Main features of Sample Households:

The main features of sample households related to wheat, gram and Tur are dealt in this sub heads.

4.1.1 Wheat Growers

The socio-economic profile, land ownership pattern, cropping pattern, acreage, yield and investment pattern were observed for wheat growers.

An average age of a wheat grower (decision maker) was found to be of 45.87 years. All the wheat growers were found to be head of their family and opt crop farming as a main occupation for their livelihood. The social group of the studies are constitutes OBC (55%) General (33%) and SC/ST (12%). (Table 4.1) The average size of family members was found to be 7 comprised of 4 males and 3 females.

Table 4.1: Characteristics of selected wheat growers

Characteristics	Marginal	Small	Medium	Large	All Farms
Age of decision maker (yrs)	51.12	47.88	43.08	41.4	45.87
Main Occupation (%)					
Crop Farming	100	100	100	100	100
Dairy	0	0	0	0	0
Service	0	0	0	0	0
Farm labour	0	0	0	0	0
Others.	0	0	0	0	0
Education(years of schooling)	5	6	10	11	8
Family Size (no.)	7	7	6	8	7
Male	4	4	4	4	4
Female	3	3	3	4	3
Social Grouping (%)					
General	6	10	7	10	33
SC/ST	7	4	1	0	12
OBC	12	11	17	15	55
Others	0	0	0	0	0
Gender of head of household (%)					
Male	100	100	100	100	100
Female	0	0	0	0	0

An average wheat grower of the study area operated 6.22 ha irrigated land and 0.06 ha of un-irrigated land. The average size of land operated under marginal, small, medium and large farmers was found to be 1.05 ha, 3.25 ha, 9.33 ha and 11.50 ha respectively. The total operated holding was found to be higher than the owned land in all size of farms, due to practice of leased in land was observed in the area under study. The 0.31 ha, 1.47 ha, 5.59 ha and 1.46 ha leased in land was observed to be cultivated by marginal, small, medium and large size of farmer respectively. An average HH cultivated 2.21 ha of leased in land for cultivation of crops. The practice of leased out land was not popular in the area only 1 large sized wheat grower leased out his 0.19 ha land to other farmer (Table 4.2).

Table 4.2: Operational holding of wheat growers at different size of farms (Average)

Size of Farm	Owned Land		Leased in Land		Leased out land		Total Operational Holding	
	Irr.	Unirr.	Irr.	Unirr.	Irr .	Unirr.	Irr.	Unirr.
Marginal	0.73	0.01	0.31	0	0	0	1.04	0.01
Small	1.74	0.03	1.47	0	0	0	3.22	0.03
Medium	3.58	0.16	5.59	0	0	0	9.17	0.16
Large	10.19	0.05	1.46	0	0.19	0	11.45	0.05
All farms	**4.06**	**0.06**	**2.21**	**0.00**	**0.05**	**0.00**	**6.22**	**0.06**

The surface/canal (82.90%) followed by tube well (17.10) irrigation was found to be major sources of irrigation in all the categories of farms in the area under study (Table 4.3).

Table 4.3: Source of Irrigation at different size of farms (Average)

Size of Farm	Source of Irrigation (%)			
	Surface/Canal	Tube Well/Ground-Water	Tanks	Others
Marginal	76.89	23.11	0	0
Small	85.19	14.81	0	0
Medium	86.84	13.16	0	0
Large	79.65	20.35	0	0
All farms	82.90	17.10	0	0

The cultivation on leased in land was found to be more in medium farmers (22.24%) followed by small (5.87%), large (5.80%) and marginal (1.24%). On an average 8.79 per cent of area was found to be leased in land. The majority i.e. 56 per cent of medium HHs leased in land fallowed by large (32%), small (32%) and marginal (20%). The term of leased in land was found to be on fixed money, which was found to be Rs. 31997.42 per ha per year and ranged between Rs. 30728.23/ha (medium) to Rs. 33032.86/ ha (small). (Table 4.4)

Table 4.4: Terms of Lease in land in different size of farms (Average)

Size of Farm	Incidence		Terms			Rent		
	% Area leased in	% HHs leasing in	For fixed money	Fixed produce	Share of Produce	For fixed money	Fixed produce	Share of Produce
			(%)	(Qtl.)	(%)	(Rs./ha)	(Qtl.)	(%)
Marginal	1.24	20	100	0	0	32804.69	0	0
Small	5.87	32	100	0	0	33032.86	0	0
Medium	22.24	56	100	0	0	30728.23	0	0
Large	5.80	32	100	0	0	31423.89	0	0
All farms	8.79	35	100	0	0	31997.42	0	0

An average wheat grower was found to be cultivate soybean (*Kharif) and* wheat (*Rabi)* as the major crops in which he allotted their 42.72% and 47.27 % of gross cropped area respectively. Paddy (7.20%), gram (2.28%), and moong (0.53%) were found to be other crops cultivated by an average wheat grower in the study area (Table 4.5).

Table 4.5: Cropping Pattern of wheat growers in different size of farms (Average)

Area (ha)

Crops	Marginal	Small	Medium	Large	All Farms
Kharif.					
Paddy	0.09	0.29	2.02	2.11	1.13
% to GCA	**4.15**	**4.62**	**10.83**	**9.19**	**7.20**
Soybean	0.96	2.83	7.27	9.23	5.07
% to GCA	**46.84**	**44.86**	**38.91**	**40.28**	**42.72**
Rabi					
Wheat	0.96	3.05	9.07	10.41	5.87
% to GCA	**46.64**	**48.46**	**48.53**	**45.44**	**47.27**
Gram	0.05	0.13	0.26	0.76	0.30
% to GCA	**2.37**	**2.06**	**1.39**	**3.32**	**2.28**
Summer					
Moong	0.00	0.00	0.06	0.40	0.12
% to GCA	0.00	0.00	0.35	1.77	0.53
Gross Cropped Area	**2.05 (100)**	**6.30 (100)**	**18.69 (100)**	**22.91(100)**	**12.49(100)**
Cropping intensity %	195.37	194.02	200.35	199.30	198.84

As regards yield of respective crops cultivated by an average wheat grower in the study area, the highest yield was obtained in case of wheat (3504 kg/ha) followed by paddy (2731 kg/ha), gram (1423 kg/ha) soybean (1338 kg/ha) and moong (343 kg/ha). The yield levels were found to be almost same in all the categories of HHs with minor variations (Table 4.6).

Table 4.6: Yield (kg/ha) of major crops at different size of farms (Average)

Crops	Marginal	Small	Medium	Large	All Farms
Kharif					
Paddy	2161	2709	3186	2866	2731
Soybean	1058	1345	1531	1420	1338
Rabi					
Wheat	3166	3522	3864	3463	3504
Gram	1317	1420	1568	1388	1423
Summer					
Moong	0.00	0.00	679	692	343

As far as the level of investment on farm machinery concerned an average HH of the study area found to be invested only Rs. 4307.47/ha on farm machinery, which ranged from Rs. 3729.66 (medium) to Rs. 5153.08/ha (large). Out of the total investment on machinery, investment on tractor was found be main machine followed by tube wells, combined harvester and threshing machine. Average large farmer used to invest on combined harvester while medium and large farmer's invest on threshing machine (Table 4.7).

Table 4.7: Farm Machinery in different size of farms (Average)

Size of Farm	Level of Investment in Rs/ha.					
	Tractors	Combined Harvester	Threshing Machine	Tube well	Total	Avg. Investment per ha.
Marginal	7629.34	0.00	0.00	9345.95	16975.29	4243.82
Small	12165.30	0.00	0.00	4248.01	16413.31	4103.33
Medium	11046.39	0.00	364.50	3507.74	14918.63	3729.66
Large	10227.89	5566.20	695.77	4122.46	20612.32	5153.08
All farms	**10267.23**	**1391.55**	**265.07**	**5306.04**	**17229.89**	**4307.47**

As regards to live stocks are concerned average wheat growers have only 2 Cattles and 1 buffalo. One other live stock (goat, pig, sheep etc.) was found only in marginal and small farm size (Table 4.8).

Table 4.8: Farm Size and Livestock in different size of farms (Average)

Size of Farm	Cattle	Buffalo	Others
Marginal	2	0	1
Small	2	1	1
Medium	3	1	0
Large	2	1	0
All Farms	**2**	**1**	**0**

4.1.2 Gram growers

The socio-economic profile, land ownership pattern, cropping pattern, acreage yield and investment pattern were also observed for gram growers and result obtained are discussed below:

Table 4.9: Characteristics of selected gram growers

Characteristics	Marginal	Small	Medium	Large	All Farms
Age of decision maker (yrs)	42	45	44	46	44
Main Occupation (%)					
Crop Farming	100	100	100	100	100
Dairy	0	0	0	0	0
Service	0	0	0	0	0
Farm labour	0	0	0	0	0
Others.	0	0	0	0	0
Education(years of schooling)	5	6	9	9	7
Family Size (no.)	7	8	8	8	8
Male	4	5	4	4	4
Female	4	4	4	3	4
Social Grouping (%)					
General	2	3	5	11	21
SC/ST	7	4	4	0	15
OBC	16	18	16	14	64
Others	0	0	0	0	0
Gender of head of household (%)					
Male	100	100	100	100	100
Female	0	0	0	0	0

Average age of a gram grower (decision maker) was found to be 44.44 years. All the gram growers were found to be head of their family and opt crop farming as a main

occupation for their livelihood. The majority of them were from OBC (64%) followed by General (21%), SC/ST (15%). (Table 4.9) The average size of family members was found to be 8 comprised of 4 males and 4 females.

An average gram grower of the study area operated 4.78 ha irrigated land and 0.58 ha of un-irrigated land. The average size of operated land of marginal, small, medium and large farmers was found to be 0.75 ha, 1.86 ha, 4.86 ha and 14.85 ha respectively. The total operated holding was found to be higher than the owned land in all size of farms. The practice of leased in land was observed in the area under study. The 0.04 ha, 0.06 ha, 0.32 ha and 0.51 ha leased in land found to be cultivated by marginal, small, medium and large size of farmer respectively. An average HH cultivated 0.03 ha of leased in land in cultivation of crops. The practice of leased out land was not popular in the area none of the house hold was found to leased out his land to other farmer (Table 4.10).

Table 4.10: Operational holding of gram growers in different size of farms (Average)

Size of Farm	Owned Land		Leased in Land		Leased out land		Total Operational Holding	
	Irr.	Unirr.	Irr.	Unirr.	Irr.	Unirr.	Irr.	Unirr.
Marginal	0.57	0.14	0.04	0	0	0	0.61	0.14
Small	0.85	0.76	0.06	0	0	0	0.90	0.76
Medium	3.02	0.84	0.32	0	0	0	3.34	0.84
Large	13.77	0.57	0.51	0	0.00	0	14.28	0.57
All farms	**4.55**	**0.58**	**0.23**	**0.00**	**0.00**	**0.00**	**4.78**	**0.58**

The tube well/ground (89.71%) water followed by tanks (8.26%) was found to be major sources of irrigation in all the categories of farms in the area under study (Table 4.11).

Table 4.11: Source of Irrigation in different size of farms (Average)

Size of Farm	Source of Irrigation (%)			
	Surface/Canal	Tube Well/Ground-Water	Tanks	Others
Marginal	0.00	76.73	17.20	6.61
Small	0.00	78.32	13.86	8.43
Medium	0.00	89.99	8.14	1.91
Large	0.00	91.56	7.21	1.21
All farms	0.00	89.71	8.26	2.10

The cultivation on leased in land was found to be more in medium farmers (7.56%) followed by marginal (5.36%), large (3.44%) and small (3.41%). On an average 4.31 per cent of area was found to be leased in. The majority i.e. 32 per cent of large HHs leased in land fallowed by medium (28%), small (16%) and marginal (4%). The term of leased in land was found to be on fixed money, which was found to be Rs. 14827.99 per ha per year and ranged between Rs. 14060.00/ha (medium) to Rs. 15808.00/ ha (marginal) (Table 4.12).

Table 4.12: Terms of Lease in land in different size of farms (Average)

Size of Farm	Incidence		Terms (%)			Rent		
	% Area leased in	% HHs leasing in	For fixed money	Fixed produce	Share of Produce	For fixed money	Fixed produce	Share of Produce
			(Rs.)	(Qtl.)	(%)	(Rs./ha)	(Qtl.)	(%)
Marginal	5.36	4	640	0	0	15808.00	0	0
Small	3.41	16	860	0	0	15172.86	0	0
Medium	7.56	28	4440	0	0	14060.00	0	0
Large	3.44	32	7280	0	0	14271.11	0	0
All farms	4.31	20	3305	0	0	14827.99	0	0

An average gram grower was found to be cultivated soybean (*Kharif) and* Wheat & gram (*Rabi)* as the major crops in which he allotted 45.55%, 18.73% and 27.67 % of gross cropped area. Urad (3.22%) tur (1.65%) and lentil (3.17%) were the other crops cultivated by an average gram grower (Table 4.13).

Table 4.13: Cropping Pattern of gram growers in different size of farms (Average)

Area (ha)

Crops	Marginal	Small	Medium	Large	All Farms
Kharif					
Soybean	0.64	1.34	3.72	13.06	4.69
% to GCA	**46.01**	**43.55**	**45.86**	**46.77**	**45.55**
Urd	0.04	0.15	0.19	0.83	0.30
% to GCA	**2.61**	**5.00**	**2.29**	**2.99**	**3.22**
Tur	0.02	0.09	0.11	0.16	0.10
% to GCA	**1.74**	**2.89**	**1.40**	**0.58**	**1.65**
Rabi					
Wheat	0.25	0.51	1.57	5.87	2.05
% to GCA	**18.00**	**16.58**	**19.34**	**21.02**	**18.73**
Gram	0.39	0.84	2.32	7.47	2.76
% to GCA	**28.16**	**27.24**	**28.51**	**26.76**	**27.67**
Lentil	0.05	0.15	0.21	0.53	0.23
% to GCA	**3.48**	**4.74**	**2.59**	**1.88**	**3.17**
Gross Cropped Area	**1.39**	**3.08**	**8.12**	**27.93**	**10.13**
Cropping intensity (%)	**184.52**	**185.37**	**194.38**	**188.16**	**189.03**

As regards yield of respective crops cultivated by an average gram grower in the study area, the highest yield was obtained in case of wheat (2129 kg/ha) followed by gram (1224kg/ha) soybean (1211kg/ha), lentil (578kg.ha), tur (515 kg/ha) and urd (460 kg/ha). In all, yield levels were found to be almost same in all the categories of HHs with minor variations (Table 4.14).

Table 4.14: Yield (kg/ha) of major crops at different size of farms (Average)

Crops	Marginal	Small	Medium	Large	All Farms
Kharif					
Soybean	1109	1121	1342	1270	1211
Urd	401	483	487	469	460
Tur	424	514	519	603	515
Rabi					
Wheat	1789	1945	2380	2402	2129
Gram	1120	1090	1432	1253	1224
Lentil	590	543	613	566	578

As far as the level of investment on farm machinery is concerned an average HH of the study area found to invest only Rs. 6283,22/ha on farm machinery, which ranged from Rs. 3935.43 (large) to Rs. 7540.97 (marginal) per ha.

Table 4.15: Farm Machinery at different size of farms (Average)

Size of Farm	Level of Investment in Rs/ha.					
	Tractors	Combined Harvester	Threshing Machine	Tube well	Total	Avg. Investment per ha.
Marginal	12171.40	0.00	0.00	17992.50	30163.90	7540.97
Small	16217.66	0.00	0.00	12530.73	28748.39	7187.10
Medium	14456.20	0.00	2919.96	8501.40	25877.56	6469.39
Large	8942.13	0.00	1684.40	5115.18	15741.70	3935.43
All farms	**12946.85**	**0.00**	**1151.09**	**11034.95**	**25132.89**	**6283.22**

Out of the total investment on machinery investment on tractor was maximum followed by tube wells and threshing machine. The total as well as average investment per ha was found to be decreased with increased size of holding (Table 4.15).

As regards to live stocks an average gram grower had only3 Cattles and 1 buffalo. One other live stock (goat, pig, sheep etc.) was found only in marginal, small and medium farm size of gram grower (Table 4.16).

Table 4.16: Farm Size and Livestock position at different size of farms (Average)

Size of Farm	Cattle	Buffalo	Others
Marginal	2	0	2
Small	2	0	2
Medium	4	1	1
Large	3	2	0
All Farms	3	1	1

4.1.3 Tur growers

The socio-economic profile, land ownership pattern, cropping pattern, acreage and yield and investment pattern also observed for tur growers and it is found that an average age of a tur grower (decision maker) was found to be of 42.07 years. All the tur growers were found to be head of their family and opt crop farming as a main occupation for their livelihood. The majority of them were from OBC (54%) followed by General (38%), SC/ST (8%). (Table 4.17) Their average size of family members was found to be 8 comprised of 4 males and 4 females.

Table 4.17: Characteristics of selected tur Growers

Characteristics	Marginal	Small	Medium	Large	All Farms
Age of decision maker (yrs)	36.44	44	46.76	43.8	42.07
Main Occupation (%)					
Crop Farming	100	100	100	100	100
Dairy	0	0	0	0	0
Service	0	0	0	0	0
Farm labour	0	0	0	0	0
Others.	0	0	0	0	0
Education(years of schooling)	9	10	11	12	10.5
Family Size (no.)	5	7	8	9	8
Male	3	4	4	5	4
Female	3	4	4	4	4
Social Grouping (%)					
General	7	7	8	16	38
SC/ST	5	3	0	0	8
OBC	13	15	17	9	54
Others					
Gender of head of household (%)					
Male	100	100	100	100	100
Female	0	0	0	0	0

An average tur grower of the study area operated 4.07 ha irrigated land and 0.11 ha of un-irrigated land. The average size of operated land of marginal, small, medium and large farmers was found to be 0.90 ha, 2.08 ha, 4.38 ha and 9.34 ha respectively. The total operated holding was found to be higher than the owned land in all the size of farms due to practice of leased in land was found in area under study. The 0.02 ha, 0.26 ha, 1.27 ha and 1.17 ha land was found to be leased in by marginal, small, medium and large size of farmers respectively with an average of 0.68 ha. The practice of leased out land was not popular in the area none of the house hold was found to be leased out his land to other farmer (Table 4.18).

Table 4.18: Operational holding of tur growers in different size of farms (Average)

Size of Farm	Owned Land		Leased in Land		Leased out land		Total Operational Holding		Total (irr. & unirr.)
	Irr.	Unirr.	Irr.	Unirr.	Irr .	Unirr.	Irr.	Unirr.	
Marginal	0.80	0.08	0.02	0.00	0.00	0.00	0.82	0.08	0.90
Small	1.72	0.10	0.13	0.13	0.00	0.00	1.85	0.23	2.08
Medium	3.04	0.07	1.27	0.00	0.00	0.00	4.31	0.07	4.38
Large	8.13	0.04	1.17	0.00	0.00	0.00	9.30	0.04	9.34
All farms	3.42	0.07	0.65	0.03	0.00	0.00	4.07	0.11	4.17

The surface/canal (64.14%) followed by tube well/ground water (25.21%) was found to be major sources of irrigation in all the categories of farms in the area under study (Table 4.19).

Table 4.19: Source of Irrigation of tur growers in different size of farms

Size of Farm	Source of Irrigation (%)			
	Surface / Canal	Tube Well / Ground-Water	Tanks	Others
Marginal	78.63	12.27	0	9.1
Small	63.14	19.24	0	17.62
Medium	60.56	29.21	0	10.23
Large	54.23	40.12	0	5.65
All farms	64.14	25.21	0	10.65

The cultivation on leased in land was found to be more in medium farmers (0.29%) followed by small (0.12%), large (0.12%) and marginal (0.02%).

Table 4.20: Terms of Lease in land in different size of farms (Average)

Size Class of Farm	Incidence		Terms (%)				Rent		
	% Area leased in	% HHs leasing in	For fixed money (Rs.)	Fixed produce (Qtl.)	Share of Produce (%)	Others	For fixed money (Rs.)	Fixed produce (Qtl.)	Share of Produce (%)
Marginal	0.02	8	100	0	0	0	10000	0	0
Small	0.12	20	100	0	0	0	12840	0	0
Medium	0.29	32	100	0	0	0	12571	0	0
Large	0.12	16	100	0	0	0	13250	0	0
All farms	0.16	19.00	100	0.00	0.00	0.00	12165.25	0.00	0.00

On an average 0.16 per cent of area was found to be leased in. The majority i.e. 32 per cent of medium HHs leasing in land fallowed by small (20%), large (16%) and marginal (8%). The term of leased in land was found to be on fixed money, which was found to be Rs. 12165.25 per ha per year and ranged between Rs. 10000.00/ha (marginal) to Rs. 13250.00/ ha (large) (Table 4.20).

Table 4.21: Cropping Pattern of tur growers in different size of farms (Average) Area (ha)

Crop	Marginal	Small	Medium	Large	All Farms
Kharif					
Paddy	0.00	0.02	0.09	0.08	0.05
% to GCA	0.00	0.48	1.03	0.44	0.58
Tur	0.20	0.76	1.43	3.32	1.43
% to GCA	11.24	18.40	16.38	18.19	17.36
Soybean	0.70	1.27	2.78	5.81	2.64
% to GCA	39.33	30.75	31.84	31.84	32.11
Rabi					
Wheat	0.63	1.27	2.58	5.83	2.58
% to GCA	35.39	30.75	29.55	31.95	31.35
Gram	0.21	0.76	1.70	3.10	1.44
% to GCA	11.80	18.40	19.47	16.99	17.54
Vegetables	0.03	0.02	0.00	0.00	0.01
% to GCA	1.69	0.48	0.00	0.00	0.15
Summer					
Moong	0.01	0.02	0.12	0.01	0.04
Perennial					
Sugarcane	0.00	0.01	0.03	0.10	0.04
% to GCA	0.00	0.24	0.34	0.55	0.43
GCA	**1.78**	**4.13**	**8.73**	**18.25**	**8.22**
Cropping intensity	**198.03**	**198.79**	**199.17**	**195.48**	**197.00**

An average tur grower used to grain, tur and soybean (*Kharif) and* Wheat & gram (*Rabi)* as the major crops and allotted 17.36%, 32.11%, 31.35% and 17.54 % of gross cropped area. Paddy (0.58%), moong (0.49%) sugarcane (0.43%), and vegetables (0.15%) were found to be other crops cultivated by an average tur grower in the study area (Table 4.21).

As regards yield of respective crops cultivated by an average tur grower in the study area, the highest yield was obtained from sugarcane (31375.00 kg/ha) followed by vegetables (13750.00kg/ha), wheat (3660.50kg/ha), paddy (2434.50kg/ha), gram (1416.75kg.ha), soybean (1409.50 kg/ha), moong (1140.50) and tur (1040.00 kg/ha). The yield levels were found to be almost same across different categories of HHs with minor variations (Table 4.22).

Table 4.22: Yield (kg/ha) of major crops in different size of farms (Average)

Crop	Marginal	Small	Medium	Large	All Farms
Kharif					
Paddy	2021.00	2322.00	2854.00	2541.00	2434.50
Arhar	910.00	950.00	1260.00	1040.00	1040.00
Oilseeds	1113.00	1340.00	1735.00	1450.00	1409.50
Rabi					
Wheat	3212.00	3430.00	4250.00	3750.00	3660.50
Pulses	1280.00	1394.00	1581.00	1412.00	1416.75
Vegetables	25000.00	30000.00	0.00	0.00	13750.00
Summer					
Moong	830.00	914.00	1500.00	1318.00	1140.50
Perennial					
Sugarcane	0.00	38000.00	45000.00	42500.00	31375.00

As far as the level of investment on farm machinery is concerned, an average tur grower HH invested only Rs. 15625.09/ha on farm machinery, which ranged from Rs. 14181.61(large) to Rs. 16745.84 (small) per ha. Out of the total investment on machinery, investment on tractor was maximum (31602.51) found a main item followed by tube wells (26648.24) and threshing machine (4249.61). The total as well as average investment per ha was found to be decreased with increased size of holding (Table 4.23).

Table 4.23: Farm Machinery in different size of farms (Average)

Size of Farm	Level of Investment in Rs/Ha.					
	Tractors	Combined Harvester	Threshing Machine	Tube Well	Total	Avg. Investment per ha.
Marginal	17800.20	0.00	1891.27	46725.52	66416.99	16604.25
Small	40432.62	0.00	2117.90	24432.86	66983.38	16745.84
Medium	34586.94	0.00	5877.04	19410.66	59874.64	14968.66
Large	33590.29	0.00	7112.23	16023.94	56726.45	14181.61
All farms	31602.51	0.00	4249.61	26648.24	62500.36	15625.09

As regards to live stocks are concerned an average tur grower had only 2 cattles and 1 buffalo. One other live stock (goat, pig, sheep etc.) was found only in marginal, small and large farm size of tur grower (Table 4.24).

Table 4.24: Farm Size and Livestock of tur growers in different size of farms (Average)

Size of Farm	Cattle	Buffalo	Others
Marginal	1	1	4
Small	1	1	1
Medium	2	1	0
Large	1	1	1
All Farms	2	1	1

4.2 Estimation of grain losses at different stage.

The estimation of crop losses at different stage has been analysed for selected crops i.e. wheat, gram and tur and presented in this sub head.

Crop losses in harvesting, threshing and winnowing in wheat have been observed and and found that 2.60 , 1.49 , and 4.09 per cent losses were estimated in harvesting, threshing and total loses respectively in wheat production. The losses occurred in harvesting were found more as compared to threshing in wheat. As the size of farm increased the total losses increased from 3.61 (marginal) to 4.68 per cent (medium) (Table 4.25).

Table 4.25: Grain losses on farm in selected crops in different size of farms (Average)

Size of Farm	Mode/Method	% Loss in Harvesting.	Mode/Method	% loss in Threshing	% Loss in Winnowing	Total % loss
Wheat						
Marginal	Manual	2.24	Mechanical	1.37	0	3.61
Small	Manual/Mechanical	2.31	Mechanical	1.58	0	3.89
Medium	Manual/Mechanical	2.78	Mechanical	1.9	0	4.68
Large	Manual/Mechanical	3.08	Mechanical	1.1	0	4.18
All farms	**Manual/Mechanical**	**2.60**	**Mechanical**	1.49	0	4.09
Gram						
Marginal	Mechanical	2.38	Mechanical	1.27	0	3.65
Small	Mechanical	2.41	Mechanical	1.18	0	3.59
Medium	Mechanical	2.84	Mechanical	1.08	0	3.92
Large	Mechanical	3.13	Mechanical	0.98	0	4.11
All farms	**Mechanical**	**2.69**	**Mechanical**	**1.13**	**0**	**3.82**
Tur						
Marginal	Manual	2.00	Manual	0.31	0.18	2.49
Small	Manual	2.01	Manual	0.34	0.20	2.55
Medium	Manual	2.57	Manual	0.40	0.23	3.20
Large	Manual	3.02	Manual	0.50	0.31	3.83
All farms	Manual	2.40	Manual	0.39	0.23	3.02

In gram productivity 2.69, 1.13, and 3.82 per cent losses were estimated in harvesting, threshing & winnowing and total losses respectively. The losses occurred in harvesting (2.69%) were found more as compared to threshing & winnowing (1.13%) in gram. The total Losses were found to increase with increases in size of farm increased the total per cent losses increased from 2.38% (marginal) to 3.13% (large) in harvesting, while decreased in threshing & winnowing of gram from 1.27 (marginal) to 0.98 per cent (large) (Table 4.25).

Grain losses in harvesting, threshings, winnowing of tur have been observed and found that 2.40, 0.39, 0.23 and 3.02 per cent losses were estimated in harvesting, threshing, winnowing and total losses in tur production. The losses occurred in harvesting (2.40%) were found more as compared to threshing (0.39%) & winnowing (0.23%) in tur. As the size of farm increased the total losses were also found increased in harvesting, threshing and winnowing from 2.00 (marginal) to 3.02 (large) per cent, 0.31% (marginal) to 0.50% (large) and 0.18 per cent (marginal) to 0.31 (large) per cent respectively (Table 4.25).

The losses in transportation of grains from field to threshing floor and from farm to market for wheat, gram and tur are presented in table 4.26. It is observed from the data that the losses in transportation from field to threshing floor (0.93%) have been found more than the losses in transportation from farm to market (0.40%) in wheat. As the size of farm increased from marginal to large the losses in transportation from field to threshing floor and farm to market were found to be decreased respectively from 1.02 (marginal) to 0.88 per cent (large) and 0.45 (marginal) to 0.37 per cent (large) respectively in wheat.

The losses in transportation from field to threshing floor (0.35%) have also been found more than the losses in transportation from farm to market (0.21%) in gram. As the size of farm increased from marginal to large the losses in transportation from field to threshing floor and farm to market were found to be decreased respectively from 0.42 (marginal) to 0.28 per cent (large) and 0.24 per cent (marginal) to 0.16 per cent (large) respectively (Table 4.26).

The losses in transportation from field to threshing floor (0.10%) have also been found more than the losses in transportation from farm to market (0.05%) in tur. These losses were found to be same in all size of farms with minor variations.

Table 4.26: Grain Losses during transportation in selected crops in different size of farms

(Average)

Size of Farm	Field to threshing floor		Field/Farm to Market	
	Mode/Method	% losses	Mode/Method	% losses
Wheat				
Marginal	Bullock Cart/Tractor trolley	1.02	Bullock Cart/Tractor trolley	0.45
Small	Bullock Cart/Tractor trolley	0.97	Bullock Cart/Tractor trolley	0.4
Medium	Tractor trolley	0.83	Tractor trolley	0.36
Large	Tractor trolley	0.88	Tractor trolley	0.37
All farms	Bullock Cart/Tractor trolley	0.93	Bullock Cart/Tractor trolley	0.40
Gram				
Marginal	Bullock Cart/Tractor	0.42	Bullock Cart/Tractor	0.24
Small	Bullock Cart/Tractor	0.37	Bullock Cart/Tractor	0.23
Medium	Tractor	0.33	Tractor	0.19
Large	Tractor	0.28	Tractor	0.16
All farms	Bullock Cart/Tractor	0.35	Bullock Cart/Tractor	0.21
Tur				
Marginal	Bullock cart / tractor trolly	0.10	Bullock cart / tractor trolly	0.05
Small	Bullock cart / tractor trolly	0.12	Bullock cart / tractor trolly	0.05
Medium	Tractor trolly	0.08	Tractor trolly	0.04
Large	Tractor trolly	0.09	Tractor trolly	0.05
All farms	Bullock cart / tractor trolly	0.10	Bullock cart / tractor trolly	0.05

The grain losses in storage at producer level have also been observed at different types of storage structures for wheat, gram and tur present in the study area and presented in Table 4.27. It is observed from the data that the maximum quantity of wheat grains were found to be stored in *pacca* storage (32326.61 q) followed by *kaccha* storage (2340.64 q), steel bin (931.87 q) and gunny bags (352.68 q), while the maximum losses were observed in *kaccha* house (3.10%) followed by gunny bag (2.73%), *pacca* house (2.48%), and steel bin (1.87%). As regards to time of storage in different types of storage structure is concerned the maximum time period of storage was found to be in steel bin (234 days) followed by *pacca* house (187 days), gunny bag (158 days), and *kaccha* house (138 days). The average cost of storage was found to be more in *kaccha* house (Rs. 0.87/q/month) followed by *pacca* storage (Rs 0.64/q/month), gunny bag (Rs 0.48/q/month), and steel bin (Rs 0.37/q/month).

The maximum quantity of gram grains were stored in *pacca* storage (1168.11 q) followed by *kaccha* storage (421.71 q), and gunny bags (275.01 q), while the maximum losses were observed in *kaccha* house (3.76%) followed by gunny bag (3.63%), and *pacca* house (2.96%) (Table 4.27). As regards time of storage is concerned in different types of storage structure the maximum time period of storage was in *pacca* house (158 days) followed by kuccha house (112 days) and gunny bag (97 days). The average cost of storage was found to be more in *kaccha* house (Rs. 0.89/q/month) followed by *pacca* storage (Rs 0.65/q/month), and gunny bag (Rs 0.58/q/month). It is also observed during the investigation

that none of gram grower used steel bin to store grain and not received any subsidy to construct additional storage facilities to store grains in their farm.

The maximum quantity of tur grains were found to be stored in *pacca* storage (178.79 q) followed by gunny bags (100.83 q), steel bin (77.00 q) and *kaccha* storage (30.71 q) while the maximum losses were observed in gunny bags (0.1%) followed by *kaccha* house (0.05%), *pacca* house (0.02%), and steel bin (0.01%). As regards time of storage in different types of storage structure is concerned the maximum time period of storage was found in *pacca* house and steel bin (180 days) followed by *kuccha* house among to (120 days) (Table 4.32). The average cost of storage was found to be more in gunny bags (Rs. 2.08/q/month) followed by steel bin (Rs 1.36/q/month*), kaccha* house (Rs. 0.65/q/month) and *pucca* house (Rs 0.36/q/month). It was also observed during the investigation that none of gram grower used steel bin to store gram grains and not received any subsidy to construct additional storage facilities to store grains in their farm.

Table 4.27: Losses in selected crops during the storage at producers' level in different size of farms

(Average)

Type of Storage	Amount of Quantity stored	% of Total Storage Capacity	% of Stored Quantity Lost	Storage Time in Days	Average Cost of Storage Rs./q/Month
Wheat					
Kaccha storage with Earthen floor, wall, roof	2340.64	66.88	3.1	138	0.87
Pucca storage with cemented floor, wall, roof	3226.61	71.70	2.48	187	0.64
Steel storage bin	931.87	93.19	1.87	234	0.37
Gunny bag	352.88	88.22	2.73	158	0.48
Gram					
Kaccha storage with Earthen floor, wall, roof	421.71	62.94	3.76	112	0.89
Pucca storage with cemented floor, wall, roof	1168.11	73.01	2.96	158	0.65
Steel storage bin	0.00	0.00	0.00	0.00	0
Gunny bag	275.01	58.51	3.63	97	0.58
Tur					
Kaccha storage with Earthen floor, wall, roof	30.71	10	0.05	120	0.651
Pucca storage with cemented floor, wall, roof	178.79	7	0.02	180	0.364
Steel storage bin	77	80	0.01	180	1.364
Gunny bag	100.83	70	0.1	120	2.083

4.2.1   Total grains loss during marketing

The total grains losses during different stages in wheat, gram and tur have been presented in table 4.28. It is observed from the data that on an average size of farm 1.46 per cent (1.46 kg/q) total losses were recorded in wheat. In different stages the maximum losses of grains were found in storage (0.59%) followed by weighing (0.43 %), transportation (0.40 %) and handling (0.04%). It is also observed from the data that as the size of farms increases the total gains losses in wheat increased from 1.34 (marginal) to 1.64 per cent (large). It is also observed from the data that on an average size of farm 4.33 per cent (4.33 kg/q) total losses were recorded in gram. In different stages the maximum losses of grains were found in storage (3.77%) followed by weighing (0.31 %), transportation (0.21 %) and handling (0.04%). It is also observed from the data that as the size of farms increases the total gains losses in gram increased from 3.19 per cent (marginal) to 5.77 (large) (Table 4.28).

In case of tur an average size of farm 0.26 per cent (0.26 kg/q) losses were recorded. In different stages the maximum losses of tur grains was found in transportation (0.15%) followed by weighing (0.039 %), handling (0.036%) and storage (0.035%). It is also observed from the data that the maximum total losses were revealed in small (0.28%) size of farms followed by marginal (0.26%), large (0.25%) and medium (0.23%).

Table 4.28: Losses during handling and Weighing (%)in different size of farms

(Average)

Size Class of Farm	Transportation losses	Storage losses	Handling	Weighing	Total losses
Wheat					
Marginal	0.45	0.51	0.038	0.34	1.34
Small	0.4	0.56	0.041	0.41	1.41
Medium	0.36	0.6	0.047	0.45	1.46
Large	0.37	0.69	0.049	0.53	1.64
All farms	0.4	0.59	0.04	0.43	1.46
Gram					
Marginal	0.24	2.67	0.029	0.25	3.19
Small	0.23	3.09	0.031	0.28	3.63
Medium	0.19	4.11	0.044	0.34	4.68
Large	0.16	5.21	0.047	0.35	5.77
All farms	0.21	3.77	0.04	0.31	4.33
Tur					
Marginal	0.15	0.05	0.02	0.032	0.26
Small	0.17	0.04	0.029	0.035	0.28
Medium	0.12	0.03	0.041	0.041	0.23
Large	0.14	0.02	0.052	0.048	0.25
All farms	0.145	0.035	0.036	0.039	0.26

4.3   Estimation of marketable and marketed surplus ratio.

In estimation of marketable and marketed surplus, net availability of grain, sale pattern, crop retention pattern and marketable and marketed surplus ratio at different size of farms related to selected crops i.e. wheat, gram and tur have been observed and dealt in this sub head.

4.3.1   Net availability

As regards to net availability of wheat in different size of farms of wheat growers is concerned it is found that an average wheat grower of the study area had an 225.23 q. of net availability of wheat, out of which 14.63 q and 210.6 q were the previous year stock and current year production of his farm. It is also observed from the data that the size of farm increases the net availability of gram per farm and various farms from 29.88 quintals (marginal) to 403.36 (large) (Table 4.29).

Table 4.29: Net Availability of selected crops by farm size in quintals in different size of farms

(Average)

Farm Size	Average Beginning Stock	Average Production	Net Average Availability
Wheat			
Marginal	0.48 (1.61)	29.4 (98.39)	29.88 (100)
Small	3.52 (3.18)	107.2 (96.82)	110.72 (100)
Medium	18.84 (5.28)	338.12 (94.72)	356.96 (100)
Large	35.68 (8.85)	367.68 (91.15)	403.36 (100)
All farms	14.63 (6.50)	210.6 (93.50)	225.23 (100)
Gram			
Marginal	0 (0.00)	4.4 (100)	4.4 (100)
Small	0 (0.00)	9.74 (100)	9.74 (100)
Medium	2.16 (5.79)	35.12 (94.21)	37.28 (100)
Large	9.36 (8.57)	99.92 (91.43)	109.28 (100)
All farms	2.88 (7.17)	37.29 (92.83)	40.17 (100)
Tur			
Marginal	0 **(0.0)**	8.18 **(100)**	8.18 **(100)**
Small	0 **(0.0)**	19.74 **(100)**	19.74 **(100)**
Medium	1 **(1.78)**	55.23 **(98.22)**	56.23 **(100)**
Large	3 **(3.00)**	97.09 **(97.00)**	100.09 **(100)**
All farms	1 **(2.17)**	45.06 **(97.83)**	46.06 **(100)**

As regards to net availability of gram in different size of farms. It was found that an average gram grower of the study area had an 40.17 q. of net availability of gram, out of which 2.88 q was the previous year stock and 37.29 q of average current year production of his farm. It is also observed from the data that as the size of farm increases the net availability per farm increases from 4.44 (marginal) to 109.28 quintals (large) (Table 4.29).

In case of tur it was found that an average tur grower of the study area had an 46.06 q. of net availability of tur grains, out of which 1.00 q was the previous year stock and 45.06 q of average current year production of his farm. It is also observed from the data that as the size of farm increases the net availability per farm increases from 8.18 quintals (marginal) to 100.09 quintals (large) (Table 4.29).

4.3.2 Sale pattern of selected crops

The sale pattern of wheat in different size of farms has been observed and presented in Table 4.30. It is clear from the data that an average wheat grower use to sell 82.56 per cent (17387q) of the total production (21061q). The maximum quantity of wheat was found to be sold in the month of April just after the harvest of the crop. It is also observed from the data that 96.01 per cent of total marketed surplus had been sold in regulated market/cooperative society and remaining 3.99 per cent found to be sold to private traders or to agricultural/professional money lenders present in the villages. As the size of holding increased the marketed surplus sold to govt. agencies also increases from 92.61 per cent (marginal) to 95.99 (large), while in case of sold to private trader/money lender, it was found to be decreased from 7.39 per cent (marginal) to 4.01 (large) size of farm.

An average gram grower was found to sell 88.43 per cent (3297.96q) of the total production (372.95 q). The maximum quantity of gram was found to be sold in the month of April and May just after the harvest of the crop. It is also observed from the data that 86.32 per cent of total marketed surplus has been sold in regulated market/cooperative society and remaining 13.68 per cent found to be sold to private traders or to agricultural/professional money lenders present in the villages. As the size of holding increase the marketed surplus sold to govt. agencies has also been found to be increased from 77.73 per cent (marginal) to 87.63 per cent (large), while in case of private trader/money lender it decreased from 22.26 (marginal) to 12.36 (large) size of farm (Table 4.30).

Table 4.30: Sale pattern of selected crops in different size of farms (Average)

Size of Farms	Total Production	Total qty. sold	Month of Sales (Maximum)	Distance (in km)	Govt. Agencies		Pvt. Trader or Money Lender		Others	
					Qty. (% of Total)	Price	Qty.(% of Total)	Price	Qty (%of total)	Price
Wheat										
Marginal	736	514 **(69.84)**	April	11.64	92.61	1385.00	7.39	1460.80	0	0
Per farm	29.44	20.56								
Small	2680	2048 **(76.42)**	April	10.68	93.75	1385.00	6.25	1446.00	0	0
Per farm	107.2	81.92								
Medium	8453	7047 **(83.37)**	April	12.16	96.93	1385.00	3.07	1464.00	0	0
Per farm	338.12	281.88								
Large	9192	7778 **(84.62)**	April	11.28	95.99	1385.00	4.01	1470.40	0	0
Per farm	367.68	311.12								
All farms	21061	17387 **(82.56)**	April	11.44	96.01	1385.00	3.99	1460.3	0	0
Per farm	210.61	173.87								
Gram										
Marginal	110	93.52 **(85.02)**	April & May	13.45	72.7	2610	27.29	25.85	0	0
Per farm	4.4	3.74								
Small	243.5	209.34 **(85.97)**	April & May	14.19	80.19	2548	19.80	2327	0	0
Per farm	9.74	8.37								
Medium	878	765.2 **(87.15)**	April & May	14.01	85.19	2668	14.80	2533	0	0
Per farm	35.12	30.61								
Large	2498	2229.9 **(89.27)**	April & May	13.16	87.63	2552	12.36	2400	0	0
Per farm	99.92	89.20								
All farms	3729.5	3297.96 **(88.43)**	April & May	13.70	2846.75	86.32	451.21	13.68	0	0
Per farm	37.30	32.98								
Tur										
Marginal	204.49	175.86 **(86.00)**	March	9.6	30.00	2900	60.00	2830.00	10.00	2715
Per farm	8.18	7.03								
Small	493.41	425.57 **(86.25)**	March	10.7	38.00	3015	50.00	2850.00	12.00	2765
Per farm	19.74	17.02								
Medium	1380.69	1300.61 **(94.2)**	March	12.1	65.00	3200	30.00	2910.00	5.00	2820
Per farm	55.23	52.02								
Large	2427.37	2308.91 **(95.12)**	March	12	75.00	3240	23.00	2980.00	2.00	2840
Per farm	97.09	92.36								
All farms	4589.11	4287.04 **(93.41)**	March	11.1	52.00	3088.75	40.75	2892.50	7.25	2785
Per farm	183.56	171.48								

An average tur grower used to sell sold 93.14 per cent (4287.04q) of the total production (4589.11q). The maximum quantity of tur was sold in the month of March just

after the harvest of the crop. It is also observed from the data that 52.00 per cent of total marketed surplus had been sold in regulated market/cooperative society and remaining 40.75 and 7.25 per cent had been sold to private traders or to agricultural/professional money lenders and direct to consumers. As the size of holding increased, the marketed surplus sold to govt. agencies also found to be increased from 30.00 (marginal) to 75.00 per cent (large), while sell of tur in case of private trader/money lender and other sources marketed surplus decreased from 60.00 (marginal) to 23.00 per cent (large) and 10.00 (marginal) to 2.00 per cent (large) (Table 4.30).

4.4 Crop retention pattern

Crop retention pattern related to selected crops (wheat, gram and tur) has been observed and presented in table 4.31. It is observed from the data that an average wheat grower found to retain 52.3 q of wheat for self consumption, seed, feed and other purposes. Out of which the share of seed (34.85%), was found to be maximum followed by family consumption (30.26%), feed (11.67%), payments in kind (16.43%) and other (6.79) It is also clear from the observation that as the size of holding increases the retention for self consumption decreased from 67.54 (marginal) to 30.26 per cent (large), while retention for seed, feed, other and payments in kind increased from 16.84 (marginal) to 36.64 per cent (large); 7.02 (marginal) to 11.67 per cent (large); 0.0 (marginal) to 8.93 per cent (large) and 8.60 per cent (marginal) to 18.34 per cent (large), respectively (Table 4.31).

An average gram grower found to retain 7.20 q of gram for self consumption, seed, feed and other purposes. Out of which the share of seed (78.70%) was found to be maximum followed by family consumption (10.41%), payments in kind (6.27%), and feed (4.61%). It is also clear from the observation that as the size of holding increases the retention for self consumption, seed and payment in kind decreased from 59.34 per cent (marginal) to 5.99 per cent (large), 9.07 (small) to 4.02 (large) per cent and 16.38 (marginal) to 5.22 per cent (large) size of farm respectively, while retention for seed increased from 24.27 (marginal) to 84.84 per cent (large) (Table 4.31).

An average tur grower was found to retain 2.95q of tur grains for self consumption, seed, feed and other purposes. Out of which the share of family consumption (46.14%) was found to be maximum followed by seed (28.48%) and payments in kind (15.34%). It is also clear from the observations that as the size of holding increases the retention for self consumption decreased from 69.86 (marginal) to 35.80 per cent (large), while retention for seed, payment in kinds and others increases with size of farm from 26.65 (marginal) to 38.87

(large), 3.45 (marginal) to 13.72 per cent (large) and 0.00 per cent (marginal) to 11.61 per cent (large), respectively (Table 4.31).

Table 4.31: Crop retention pattern in different size of farms (Average)

Farm Size	Self-consumption			Seed (2)	Feed (3)	Others (4)	Payments in kind (5)	Total retention (1+2+3+4+5)
	Retention (1)	Purchased[1]						
		Qty	Price					
Wheat								
Marginal	7.7 (67.54)	10.2	15561.12	1.92 (16.84)	0.8 (7.02)	0 (0.0)	1.0 (8.60)	11.4 (100)
Small	13.64 (44.87)	5.88	9471.50	9.52 (31.32)	3.2 (10.53)	0.36 (1.18)	3.7 (12.11)	30.4 (100)
Medium	19.4 (25.87)	1.24	2006.32	27.6 (36.80)	9.64 (12.85)	5.6 (7.47)	12.8 (17.01)	75.0 (100)
Large	22.52 (24.41)	0.56	915.94	33.8 (36.64)	10.76 (11.67)	8.24 (8.93)	16.9 (18.34)	92.2 (100)
All farms	15.82 (30.26)	4.47	6988.72	18.21 (34.85)	6.1 (11.67)	3.55 (6.79)	8.58 (16.43)	52.3 (100)
Gram								
Marginal	0.39 (59.34)	0	0	0.16 (24.27)	0.00 (0.00)	0	0.11 (16.38)	0.66 (100)
Small	0.51 (37.62)	0	0	0.53 (38.93)	0.12 (9.07)	0	0.20 (14.37)	1.37 (100)
Medium	0.90 (13.55)	0	0	4.92 (73.74)	0.40 (5.94)	0	0.45 (6.77)	6.67 (100)
Large	1.19 (5.92)	0	0	17.04 (84.84)	0.81 (4.02)	0	1.05 (5.22)	20.08 (100)
All farms	0.75 (10.41)	0	0	5.66 (78.70)	0.33 (4.61)	0	0.45 (6.27)	7.20 (100)
Tur								
Marginal	0.80 (69.86)	0.00	0.00	0.31 (26.65)	0.00 (0.0)	0.00 (00)	0.04 (3.49)	1.15 (100)
Small	1.34 (49.38)	0.00	0.00	0.53 (19.66)	0.00 (0.0)	0.35 (12.90)	0.49 (18.06)	2.71 (100)
Medium	1.61 (50.21)	0.00	0.00	0.68 (21.23)	0.00 (0.0)	0.28 (8.89)	0.63 (19.67)	3.20 (100)
Large	1.70 (35.80)	0.00	0.00	1.84 (38.87)	0.00 (0.0)	0.55 (11.61)	0.65 (13.72)	4.74 (100)
All farms	1.36 (46.14)	0.00	0.00	0.84 (28.48)	0.00 (0.0)	0.30 (10.04)	0.45 (15.34)	2.95 (100)

4.5   Marketable and marketed surplus ratio

Marketable and marketed surplus ratio has been analysed for wheat, gram and tur and presented in table 4.32.

It is observed from the data that marketed surplus of wheat was found to be more than marketable surplus in different size of farms. Marketable surplus of wheat was found to be maximum in medium (77.82%) size of farm followed by large (74.19%), small (71.64%) and marginal (61.22%), while, marketed surplus found to be increased with size of farms from 69.93 per cent (marginal) to 84.62 per cent (large).

In case of gram marketed surplus was found to be more than marketable surplus in medium and large size of farm, while it was found equal in marginal and small size of farms. Marketable surplus of gram was found to be maximum in   small and marginal (85.93%) size of farm, followed by medium (81.01%) and large (79.90%), while, marketed surplus found to be increased with size of farms from 85.00 per cent (marginal) to 89.27 (large).

Table 4.32: Marketable and marketed surplus ratio in different size of farms (Average)

Farm size	Total production	Total retention	Marketable surplus	Marketed surplus
Wheat				
Marginal	29.4 (100.00)	11.40 (38.15)	18.00 (61.22)	20.56 (69.93)
Small	107.20 (100.00)	30.40 (27.46)	76.80 (71.64)	81.92 (76.42)
Medium	338.12 (100.00)	75.00 (21.01)	263.12 (77.82)	281.88 (83.37)
Large	367.68 (100.00)	92.24 (22.87)	275.14 (74.19)	311.12 (84.62)
Overall	210.61 (100.00)	52.26 (23.20)	158.34 (75.19)	173.87 (82.57)
Gram				
Marginal	4.4 (100)	0.66 **(100)**	3.74 (85.00)	3.74 (85.00)
Small	9.74 (100)	1.37 **(100)**	8.37 (85.93)	8.37 (85.93)
Medium	35.12 (100)	6.67 **(100)**	28.45 (81.01)	30.61 (87.16)
Large	99.92 (100)	20.08 **(100)**	79.84 (79.90)	89.2 (89.27)
Overall	37.29 (100)	7.20 **(100)**	30.09 (80.69)	32.98 (88.44)
Tur				
Marginal	8.18 (100)	1.15 **(100)**	7.03 (86.00)	7.03 (86.00)
Small	19.74 (100)	2.71 **(100)**	17.02 (86.25)	17.02 (86.25)
Medium	55.23 (100)	3.20 **(100)**	53.02 (96.01)	52.02 (94.2)
Large	97.09 (100)	4.74 **(100)**	95.36 (98.21)	92.36 (95.12)
Overall	45.89 (100)	2.95 **(100)**	43.11 (93.94)	42.87 (93.42)

It is observed from the data that marketable surplus of tur was found to be more than marketed surplus in medium and large size of farm, while it was found equal in marginal and small size of farms. Marketable surplus of tur was found to be more in large (98.21%) size of farm followed by medium (96.01%), small (86.25%) and marginal (86.00%), while marketed surplus found to be increased with size of farms from 86.00 (marginal) to 95.12 per cent (large).

4.6   Factors affecting marketed surplus

To analyze factors affecting marketed surplus; Socio economic, institutional, infrastructure and technological factors have been considered for selected crops

4.6.1   Socio economic factors

An attempt have been made to analyze the factors affecting marketed surplus of wheat, gram and tur considering house hold size (no.), operational holding (ha), stock of previous year (q), yield of crop (kg/ha), quantity kept for seed, feed, family consumption (q), quantity distributed to labours in kind (q), price of the product and distance from mandi (km) as independent variable by using multiple regression model.

It is observed from the data that the fitted function for wheat was found to be good fit as the coefficient of multiple determinations (R^2) was 95 per cent revealed that the fitted function able to explain more that 95 per cent variability due to identified independent variables. Amongst all the independent variables i.e. operational holding (ha), stock of previous year and yield (kg/ha) were found to be positive and highly significant. The independent variables like HH size, quantity kept for feed and price were also found positive and non significant. While quantity kept for seed, family consumption, quantity retained for payment in kind (q.), and distance from the mandi were found to be negative and non significant (Table 4.33)

It is observed that the fitted function for gram was found to be good fit as the coefficient of multiple determinations (R^2) was 93 per cent revealed that the fitted function able to explain more that 93 per cent variability due to identified independent variable. Amongst all the independent variables i.e. operational holding (ha), stock of previous year were found to be positive and significant. The independent variables like HH size, yield, payment in kind and price were also found to be positive but non-significant, response over marketed surplus, while quantity kept for seed, feed, family consumption, and distance from the mandi were negative and non significant.(Table 4.33).

It is observed the data that the fitted function was found to be good fit as the coefficient of multiple determinations (R^2) was 92 per cent which revealed that the fitted function able to explain more that 92 per cent variability in dependent variable. Amongst all the independent variables i.e. area under crop (ha), yield (kg/ha) and kept for seed were found to be positive and significant. The independent variables like HH size, family consumption, payment in kind and distance from mandi were also found positive and non-significant, while

stock of previous year (q), and price (Rs/q) were found to be negative and non significant (Table 4.33).

Table 4.33: Factor affecting Marketed Surplus of Wheat in different size of farmers

S. No.	Independent Variable	b	Std. error	t
Wheat				
1	Constant	-132.744	114.554	-1.159
2	HH size (number)	4.034	12.207	0.331
3	Operation land (ha)	30.499***	1.674	18.219
4	Stock of previous Year (qtl.)	1.509***	0.447	3.378
5	Yield (kg/ha)	3.565***	0.790	4.511
6	Kept for seed (qtl.)	-0.238	1.028	-0.232
7	Kept for feed (qtl.)	0.297	2.717	0.109
8	Family consumption (qtl.)	-3.684	4.956	-0.743
9	Other (qtl.)	3.348	3.271	1.024
10	Payments in kind (qtl.)	-3.804	1.854	-2.051
11	Price (Rs/qtl)	0.020	0.077	0.256
12	Distance from Mandi (km)	-0.161	0.808	-0.199
Coefficient of Multiple determination (R2)		0.95		
Gram				
1	Constant	-63.609	37.418	-1.700
2	HH size (number)	0.425	0.694	0.613
3	Operation land (ha)	3.84***	0.389	9.883
4	Stock of previous Year (qtl.)	4.57***	0.421	10.865
5	Yield (kg/ha)	0.005	0.005	0.915
6	Kept for seed (qtl.)	-0.296	0.547	-0.541
7	Kept for feed (qtl.)	-10.083	11.904	-0.847
8	Family consumption (qtl.)	-0.252	5.258	-0.048
9	Payments in kind (qtl.)	3.251	11.152	0.292
10	Price (Rs/qtl)	0.019	0.012	1.552
11	Distance from Mandi (km)	0.000	0.003	-0.219
Coefficient of Multiple determination (R2)		0.93		
Tur				
1	Constant	-37.789	30.458	-1.241
2	HH size (number)	0.708	0.953	0.742
3	Area under crop (ha)	4.604***	0.793	5.808
4	Stock of previous Year (qtl.)	-0.814	1.268	-0.642
5	Yield (kg/ha)	0.042*	0.021	2.010
6	Kept for seed (qtl.)	25.339***	5.058	5.010
7	Family consumption (qtl.)	1.943	3.767	0.516
8	Payments in kind (qtl.)	8.733	7.293	1.197
9	Price (Rs/qtl)	-0.006	0.013	-0.448
10	Distance from Mandi (km)	0.281	0.367	0.764
11	Coefficient of Multiple determination (R2)		0.92		

Dependent variable marketed surplus
*** Level of significant 1%

4.6.2 Infrastructure factors

In infrastructure factors; distance and types of market were considered. An average wheat grower sold his maximum marketed surplus in regulated market (93.84%) as compared to unregulated market (6.16%). A farmer used to cover an average distance of 11.44 km, and 3.56 km to sell their produce in regulated and unregulated market respectively. The magnitude of all this figures was found to be same in all the farm size with minor variation (Table 4.34).

An average gram grower sold his maximum marketed surplus in regulated market (82.69%) as compared to unregulated market (17.31%), and used to farmer covered an average distance of 19.21km, and 8.20 km to sell his produce in regulated and unregulated market respectively. The magnitude of all this figures was found to be same in all the farm size with minor variation (Table 4.34).

Table 4.34: Sell pattern of selected crops

Farm Size	Regulated		Unregulated	
	Qty. (%)	Distance(km)	Qty. (%)	Distance(km)
Wheat				
Marginal	89.68	11.64	10.32	3.7
Small	91.41	10.68	8.59	3.11
Medium	96.89	12.16	3.11	3.95
Large	97.36	11.28	2.64	3.48
All farms	93.84	11.44	6.17	3.56
Gram				
Marginal	77.74	19.56	22.26	7.34
Small	80.20	20.12	19.80	8.26
Medium	85.20	19.3	14.80	8.72
Large	87.64	17.84	12.36	8.48
All farms	82.69	19.21	17.31	8.20
Tur				
Marginal	30.00	15	70.00	4.20
Small	38.00	14	62.00	7.40
Medium	65.00	16	35.00	8.20
Large	75.00	16	25.00	8.00
All farms	52.00	15.25	48.00	6.95

An average tur grower sold his maximum marketed surplus in regulated market (52.00%) as compared to unregulated market (48.00%). A farmer cover an average distance of 15.25 km, and 6.95 km to sell their produce in regulated and unregulated market, respectively. The magnitude of all this figures was found to be same in all the farm size with minor variation (Table 4.34).

The distance and type of market of wheat has been presented in Table 4.35. It is observed from the data that only 6.17 per cent quantity of total marketed surplus of wheat

grains sold in local market, while 93.83 per cent sold in distant market. The average transportation cost occurred to transport a quintal of grain was found to be Rs 8.57/q, which was found to be decreased with size of farms from Rs 9.12/q (marginal) to Rs 8.67/q (large).

It is also observed from the data that only 17.31 per cent quantity of total marketed surplus of gram grains sold in local market, while 82.69 per cent sold in regulated market. The average transportation cost occurred to transport a quintal of gram grain was found to be Rs 7.86/q, which was found to be decreased with size of farms from Rs 8.17/q (small) to Rs 7.24/q (large).

Table 4.35: Distance and type of market

Factors	Size of Farm				
	Marginal	**Small**	**Medium**	**Large**	**All farms**
Wheat					
Sale in Local Market (%)	10.32	8.59	3.11	2.64	6.17
Distant Market (%)	0	0	0	0	0
Avg. Transport Cost (Rs/Qtl.)	9.12	8.27	8.21	8.67	8.57
Type of market					
Regulated	89.68	91.41	96.89	97.36	93.83
Unregulated	10.32	8.59	3.11	2.64	6.17
Distance to market	7.67	6.90	8.06	7.38	7.5
Connected with Pucca road (%)	100	100	100	100	100
Connected with Kaccha Road (%)	0	0	0	0	0
Gram					
Sale in Local Market (%)	9.13	8.78	2.41	1.01	5.33
Distant Market (%)	0.00	0.00	0.00	0.00	0.00
Avg. Transport Cost (Rs/Qtl.)	8.12	8.17	7.89	7.24	7.86
Type of market					
Regulated	77.74	80.20	85.20	87.64	82.69
Unregulated	22.26	19.80	14.80	12.36	17.31
Distance to market	13.45	14.19	14.01	13.16	13.7025
Connected with Pucca road (%)	100	100	100	100	100
Connected with Kaccha Road (%)	0	0	0	0	0
Tur					
Sale in Local Market (%)	70	62	35	25	48
Distant Market (%)	4.2	7.4	8.2	8	6.95
Avg. Transport Cost (Rs/Qtl.)	19.2	21.4	24.2	24	22.2
Type of market					
Regulated	30	38	65	75	52
Unregulated	70	62	35	25	48
Distance to market	9.6	10.7	12.1	12	11.1
Connected with Pucca road (%)	100	100	100	100	100
Connected with Kaccha Road (%)	0	0	0	0	0

It is observed from the data that 48.00 per cent quantity of total marketed surplus of tur grains sold in local market, while 52.00 per cent and 6.95 per cent sold in regulated market and distant market respectively. The average transportation cost occurred to transport

a quintal of grain was found to be Rs 22.2/q, which was found to be increased with size of farms from Rs 19.20/q (marginal) to Rs 24.00/q (large) (Table 4.35).

The 68 per cent total wheat growers reported that they availed storage/ware houses facilities to store their wheat grains and 57 per cent of them reported that adequate storage facilities was found. The 73 per cent wheat growers reported that they are aware with the ware house receipt programme and 77 per cent of them reported that the quality of storage was found to be good in all respect in these warehouses. The cost of storage/ware house was found to be Rs 4.5/q/month to store wheat grains (Table 4.36).

The 70 per cent total gram growers reported that they availed storage/ware houses facilities to store their gram grains and 57 per cent of them reported that adequate facilities was found in govt. warehouse. The 80 per cent gram growers reported that they were aware with the ware house receipt programme and 75 per cent of them reported that the quality of storage was found to be good in all respect in these warehouses. The cost of storage/ware house was found to be Rs 4.5/q/month to store gram grains.

Table 4.36: Characteristics of storage/warehouse at different size of farms

Characteristics Available	Size of Farm				
	Marginal	Small	Medium	Large	All farms
Wheat					
Availability of Storage/Warehouse (%)	56	52	84	80	68
Agency a. Govt.	100	100	100	100	100
b. Pvt.	0	0	0	0	0
c. Cooperative	0	0	0	0	0
Adequate Storage Facility (%)	36	52	68	72	57
Quality of Storage (%)	60	68	88	92	77
Cost of Storage (Rs/q.)	4.5	4.5	4.5	4.5	4.5
Awareness of Warehouse Receipt Programme (%)	52	64	88	88	73
Gram					
Availability of Storage/Warehouse (%)	52	60	80	88	70
Agency					
a. Govt.	100	100	100	100	100
b. Pvt.	0	0	0	0	0
c. Cooperative	0	0	0	0	0
Adequate Storage Facility (%)	40	48	64	76	57
Quality of Storage (%)	64	72	80	84	75
Cost of Storage (Rs/q.)	4.5	4.5	4.5	4.5	4.5
Awareness of Warehouse Receipt Programme (%)	60	68	92	100	80
Tur					
Availability of Storage/Warehouse (%)	0	0	0	0	0
Agency					
a. Govt.	0	0	0	0	0
b. Pvt.	0	0	0	0	0
c. Cooperative	0	0	0	0	0
Adequate Storage Facility (%)	0	0	0	0	0
Quality of Storage (%)	0	0	0	0	0
Cost of Storage (Rs/q.)	0	0	0	0	0
Awareness of Warehouse Receipt Programme (%)	50	55	80	95	76.66

None of the farmers stored their tur grains in the warehouse although 76.66 per cent aware from the warehouse receipt programme.

It is surprising to note that the wheat growers reported that they were aware with all the facilities of storage/ware house provided by govt. but only 10 to 15 per cent were found to avail these facilities and majority of them sold their 95 per cent marketed surplus just after the harvest of the crops (Table 4.36).

4.6.3 Economic factors

In economic factor policy awareness was taken into consideration and much variation between the wheat, gram and tur growers was not found.

Table 4.37: Policy awareness (%)

Policy	Size of Farm				
	Marginal	Small	Medium	Large	All farms
Wheat					
Aware of MSP	96	100	100	100	99
Aware of Futures Trading	0	0	8	12	5
Used Futures	0	0	0	0	0
Futures Helped in Price Risk Management	0	0	0	0	0
Sale Possibilities	0	0	0	0	0
Yes	0	0	0	0	0
If Yes, Source	0	0	0	0	0
a. Less Retention for seed and feed.	0	0	0	0	0
b. Less Retention for self consumption.	0	0	0	0	0
c. Change in Consumption Pattern	0	0	0	0	0
Gram					
Aware of MSP	92	96	100	100	97
Aware of Futures Trading	0	0	0	0	0
Used Futures	0	0	0	0	0
Futures Helped in Price Risk Management	0	0	0	0	0
Sale Possibilities	0	0	0	0	0
Yes	0	0	0	0	0
If Yes, Source	0	0	0	0	0
a. Less Retention for seed and feed.	0	0	0	0	0
b. Less Retention for self consumption.	0	0	0	0	0
c. Change in Consumption Pattern	0	0	0	0	0
Tur					
Aware of MSP	100	100	100	100	100
Aware of Futures Trading	2	2	5	10	4.75
Used Futures	0	0	0	0	0
Futures Helped in Price Risk Management	0	0	0	0	0
Sale Possibilities					
Yes	0	0	0	0	0
If Yes, Source					
a. Less Retention for seed and feed.	0	0	0	0	0
b. Less Retention for self consumption.	0	0	0	0	0
c. Change in Consumption Pattern	0	0	0	0	0

More than 95 per cent of HHs were aware with the minimum support price of wheat declared by Central Govt. of India and sold their marketed surplus to nearby cooperative societies.

The majority of them know MSP as *Society Rate.* As far as future trading of products is concerned only 5 per cent of HHs reported that they are aware with future trading but none of them use future market. The majority of them do not know the operations and procedures of futures and commodity market. They were not aware with the price risk management and sale possibilities of futures trading (Table 4.37).

4.6.4 Institutional factors

In institutional factors credit, contact farming and different sources of information had been considered.

4.6.4.1 Credit

All the farmers reported that they have access to credit. At overall basis Cooperative society was found to be major source of credit followed by private money lender, commercial bank, relative and friend and commission agent. About 73 per cent of wheat growers reported that they got crop loan whereas 53 per cent reported for investment loan. Average wheat grower received a credit amount of Rs.169820 with outstanding of Rs 69500. At overall basis 69 per cent of wheat growers reported that they have problem in getting loan from banks and the 85 percent of them have a Kisan credit card with an average limit of Rs. 99750. As the size of holding increases the number of households investment in crop loan, credit amount and total outstanding and number and limit of Kisan credit card were found to be increased (Table 4.38).

As regards to the gram growers, the majority of them reported that Cooperative society was found to be major source of credit followed by private money lender, commercial bank, relative and friend and commission agent. 94 per cent of farmer reported that they got crop loan whereas only 6 per cent reported for investment loan. An average farmer received a credit amount of Rs.164566 with outstanding of Rs 83075. At overall basis 66 per cent of gram growers reported that they have problem in getting loan from banks and the 88 percent of gram growers have a Kisan credit card with the average limit of Rs. 122527.97. As the size of holding increases the number of households investment in crop loan, credit amount and total outstanding and number and limit of Kisan credit card were found to be increased.

Table 4.38: Assessment, source, purpose and credit.

Factors	Size of Farm				
	Marginal	**Small**	**Medium**	**Large**	**All farms**
Access to Credit (%)	100	100	100	100	100
Source					
Private money lender	52	60	12	16	35
Commission Agent	0	4	28	36	17
Relatives and Friends	24	44	32	12	28
Commercial Bank	4	16	48	64	33
Miller	0	0	0	0	0
Co-operative Society	64	76	88	100	82
Others	0	0	0	0	0
Purpose					
Crop loan	68	56	76	92	73
Investment-loan	36	48	60	68	53
Consumption	0	0	0	0	0
Credit Amount	63000	92800	172920	350560	169820
Total Outstanding	41000	59000	64000	114000	69500
Problem in getting loan from bank (yes %)	84	76	64	52	69
Have Kisan Credit Card (%)	68	80	92	100	85
If yes, Limit of KCC	34000	44000	137000	184000	99750
Gram					
Access to Credit (%)	100	100	100	100	100
Source					
Private money lender	48	56	20	12	34
Commission Agent	0	0	0	0	0
Relatives and Friends	16	32	24	8	20
Commercial Bank	8	24	52	60	36
Miller	0	0	0	0	0
Co-operative Society	60	72	80	96	77
Others	0	0	0	0	0
Purpose					
Crop loan	100	96	92	88	94
Investment-loan	0	4	8	12	6
Consumption	0	0	0	0	0
Credit Amount	46580	87540	168665	355480	164566
Total Outstanding	38700	60400	84300	156900	85075
Problem in getting loan from bank (yes %)	80	72	64	48	66
Have Kisan Credit Card (%)	72	80	100	100	88
If yes, Limit of KCC	24350.00	46756.00	129435.66	289570.23	122527.97
Tur					
Access to Credit (%)	100	100	100	100	100
Source					
Private money lender	30.54	35.00	16.00	8.00	22.39
Commission Agent	10.25	4.00	2.10	0.00	4.09
Relatives and Friends	0.00	0.00	0.00	0.00	0.00
Commercial Bank	25.33	35.22	48.00	60.00	42.14
Miller	0.00	0.00	0.00	0.00	0.00
Co-operative Society	40.25	48.65	60.05	67.25	54.05
Others	0.00	0.00	0.00	0.00	0.00
Purpose					
Crop loan	60.00	64.00	72.00	76.00	68.00
Investment-loan	8.00	12.00	16.00	16.00	13.00
Consumption	32.00	24.00	12.00	8.00	19.00
Credit Amount	375000.00	450000.00	625000.00	2625000.00	1018750.00
Total Outstanding	39375.00	42750.00	12500.00	26250.00	30218.75
Problem in getting loan from bank (yes %)	40.00	36.00	16.00	8.00	25.00
Have Kisan Credit Card (%)	60.00	64.00	84.00	92.00	75.00
If yes, Limit of KCC	15000.00	20000.00	50000.00	105000.00	47500.00

As regards to the tur here also cooperative society was found to be major source of credit followed by private money lender, commercial bank, relative and friend and

commission agent. 68 per cent of farmer reported that they got crop loan whereas only 13 per cent reported for investment loan. An average tur grower received a credit amount of Rs.101875.0 with outstanding of Rs 30218.75. At overall basis 25.00 per cent of respondent reported that they have problem in getting loan from banks and the 75 percent of tur growers have a Kisan credit card with the average limit of Rs. 47500/-. As the size of holding increases the number of households investment in crop loan, credit amount and total outstanding and number and limit of Kisan credit card were found to be increases (Table 4.38).

4.6.4.2 Contract farming

None of the wheat, gram and tur growers reported to practice contract farming in the area under study (Table 4.39).

Table 4.39: Contract farming

Factors	Size of Farm				
	Marginal	Small	Medium	Large	All farms
Wheat					
Use %	0	0	0	0	0
Crop name	0	0	0	0	0
Beneficial (%)	0	0	0	0	0
Gram					
Use %	0	0	0	0	0
Crop name	0	0	0	0	0
Beneficial (%)	0	0	0	0	0
Tur					
Use %	0	0	0	0	0
Crop name	0	0	0	0	0
Beneficial (%)	0	0	0	0	0

4.6.4.3 Source of price information

The majority of the wheat growers reported that APMC mandi (69%) was found to be major source of price information followed by visit to market (63%) buyers in villages (48%), traders (41%), Kisan call centre (37%), telephone (28%), print media (18%), radio (6%) and cooperative society (3%). The household of different size of farms reported the same percentage with minor variations (Table 4.40).

The majority of gram growers also reported that APMC mandi (71%) was found to be major source of price information followed by traders (47%), buyers in villages (36%), visit to market (22%), telephone (18%), Kisan call centre (13%), print media (12%), and radio (8%). The household of different size of farms reported the same percentage with minor variation.

As regards to tur growers the majority of them also reported that APMC mandi (31%) was found to be major source of price information followed by print media (29%), buyers in villages (20%), traders (15%), visit to market (4%), and telephone (1%). The household of different size of farms reported the same percentage with minor variation.

Table 4.40: Sources of price information (%)

Source	Size of Farm				
	Marginal	Small	Medium	Large	All farms
Wheat					
Trader	28	36	52	48	41
Print media	4	12	20	36	18
Radio	0	4	12	8	6
APMC Mandi	52	60	76	88	69
Telephone	8	20	32	52	28
Visit to Market	44	64	76	68	63
Buyers in Village	64	56	40	32	48
Cooperative Society	8	4	0	0	3
Kisan Call Centre	20	28	44	56	37
Gram					
Trader	32	44	60	52	47
Print media	0	4	12	32	12
Radio	0	8	16	8	8
APMC Mandi	60	68	72	84	71
Telephone	0	0	28	44	18
Visit to Market	36	28	16	8	22
Buyers in Village	56	48	32	8	36
Cooperative Society	0	0	0	0	0
Kisan Call Centre	16	24	8	4	13
Tur					
Trader	20	20	12	8	15
Print media	20	28	32	36	29
Radio	0	0	0	0	0
APMC Mandi	28	28	32	36	31
Telephone	0	0	0	4	1
Visit to Market	0	0	8	8	4
Buyers in Village	32	24	16	8	20
Cooperative Society	0	0	0	0	0
Kisan Call Centre	0	0	0	0	0

4.6.5 Technological factors

In technological factors area under improved seed to total area under different crops has been taken into consideration and it was observed that all the wheat growers were found to use HYVs of soybean, rice, wheat and gram in their fields. In case of tur and lentil only 86 per cent and 51.50 per cent growers used HYV in their fields (Table 4.41).

Table 4.41: Area covered under improved seed. (% to Total Area under crop)

Name of Crop	Size of Farm				
	Marginal	**Small**	**Medium**	**Large**	**All farms**
Soybean	100	100	100	100	100
Rice	100	100	100	100	100
Wheat	100	100	100	100	100
Gram	100	100	100	100	100
Tur	79	83	89	93	86
Lentil	38	39	58	71	51.5
Gram					
Soybean	100	100	100	100	100
Rice	100	100	100	100	100
Wheat	100	100	100	100	100
Gram	100	100	100	100	100
Tur	67	81	83	87	79.5
Lentil	42	45	60	70	54.25
Tur					
Rice	100	100	100	100	100
Wheat	100	100	100	100	100
Tur	70	80	100	100	87.5
Soybean	100	100	100	100	100
Gram	100	100	100	100	100

All gram growers were also found to use HYVs of soybean, rice, wheat and gram. In case of tur and lentil only 79.50 and 54.25 per cent gram growers uses HYV in their fields respectively.

As regards to sample tur farmers, all the respondents were found to cultivated HYVs of rice, wheat, soybean and gram, while 87.50 per cent area of tur was found to cultivated through HYVs.

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CHAPTER V

SUMMARY, CONCLUDING OBSERVATIONS
AND POLICY IMPLICATION

In any developing economy; the marketed surplus i.e. the quantity, which is actually made available to the non - producing population of the country of agricultural product plays a significant role., This surplus is more important than the total production of commodities from the marketing point of view. The arrangement for marketing and the expansion of markets have to be made only for the surplus quantity available with the farmers, and not for the total production. The role at which agricultural production expands determines the pace of agricultural development, while the growth in the marketed surplus determines the pace of economic development. An increase in production must be accompanied by an increase in the marketable surplus for the economic development of the country. Through the marketing system is more concerned with the surplus which enters or is likely to enter the market, the quantum of total production is essential for this surplus. The larger the production of commodity, the greater the surplus of that commodity and vice versa. The knowledge of marketed and marketable surplus helps the policy- makers as well as the traders. Price support programs are an integral part of agricultural policies necessary for stimulating agricultural production. The knowledge of quantum of marketable surplus helps in framing these policies. The procurement policy for changing the food grain through the public distribution system has to take into accounts the quantum and behaviour of marketable and marketed surplus. Similarly, the traders have to decide their purchase strategies based on marketed quantities. Advanced estimates of the surplus of such commodity, which have the potential of external trades, are useful in decision related to export and import of the commodity. If surplus is expected to be less than what is necessary the country can plan for import and if surplus is expected to be more than what is necessary, avenues for exporting such a surplus can be explored. The knowledge of marketed surplus helps in developing an adequate capacity of transport and storage system to handle it. With the above considerations in mind, the present study has been formulated in light of three important crops i.e. wheat, gram and tur of Madhya Pradesh with following specific objectives.

1. To estimate marketed and marketable surplus of wheat, gram and tur.

2. To estimate the retention of wheat and rice for consumption, seed, feed, wages and other payments in kind.

3. To examine the role of various factors such as institutional, infrastructural,

socioeconomic, etc. in influencing household marketed surplus.

Wheat, gram and tur crops have been selected for assessment of marketed surplus in Madhya Pradesh as these crops had a remarkable position in the state and contributed 11.12% 43.38% and 12.60% in total production of wheat (93.90MT), gram (7.58MT) and tur (8.65MT) of India's production basket.

A multistage sample technique has been used for selection of respondents for the study. At the first stage Hosangabad, Vidisha, and Narshingpur districts has been selected purposively for Wheat , Gram and Tur respectively as these districts are the true representative of the crops having maximum production in the state. At the Second Stage two blocks namely; Powarkheda and Sohagpur, Vidisha and Ganj basoda , and Karakbel and Saikheda were selected purposively from Hosangabad, Vidisha, and Narshingpur districts respectively as these blocks had maximum production of these crops in the districts. Thus, overall 6 blocks were selected from selected districts. Further, two Villages were selected randomly from the list of villages of the selected blocks for the study in third stage. At the last stage, a list of all the growers of the selected villages of respective crops has been prepared and categorized according to their size of holding and 25 respondents have been selected from Marginal (below 1ha), Small (1-2 ha), Medium (2-4ha) and Large (above 4 ha) categories for each crops. Thus, the total sample size for each crop was 100 Households (HHs) and the study comprise of 300 HHs of 6 blocks and 3 districts of M.P.

All the districts (50) of Madhya Pradesh have been divided into major crop producing districts and other districts for analysis of time series secondary data related to the year 1999-2000 to 2009-10. Hosangabad, Dhar, Ujjain, Harda, Vidisha, Raisen, Sehore, Indore, Dewas, Ratlam, Chhindwara, Morena, and Datia districts of M.P. has been selected as major wheat producing districts. These districts contributed 51.60 percent of total production of the state and each districts occupied more than 2.50 per cent share in production of M.P. Apart from these, remaining districts have been considered as other wheat growing districts for the analysis of trend of area, production and yield of the wheat in the state Likewise; Vidisha, Narshingpur, Sagar, Raisen, Damoh, Dewas, Ujjain, Guna, Shajapur, Sehore, Panna, Rajgarh, and Jabalpur districts have been selected as major gram producing districts. These districts had contributed 64.14 per cent of total production of the state and each district occupied more than 2.75 per cent share in production in M.P. Apart from these remaining

districts have been considered as other gram growing districts for the analysis of trend of area, production and yield of the gram in the state.

Similarly top tur producing districts viz. Narshingpur, Chhindwara, Betul, Raisen, Khandwa, Sidhi, Jabalpur, Hosangabad, Khargone, Seoni, Rewa, and Satna districts of M.P. have also been selected as major tur growing districts. These districts had contributed 69.78 per cent of total production of the state and each district occupied more than 4.90 per cent share in production in M.P. Apart from these, remaining districts have been considered as other tur growing districts for the analysis of trend of area, production and yield of the tur in the state. The analysis has also been considered for all these 3 crops viz. wheat, gram and tur for M.P. state as a whole for the period under study.

Both primary and secondary data were collected for the study. Primary data were collected from the sample respondents for the study through interview schedule provided by the coordinator of the study. The primary data includes main features of respondents; viz. socio economic profile , land utilization pattern, ownership pattern, cropping pattern, acreage and yield of selected crops and investment pattern, crop losses at different stages of handling, retention of production for home consumption, seed, wages to labours in kind etc. The time series secondary data were collected for the study from the year 1999-2000 to 2009-10. These data have been collected for area, production and productivity of selected crops, cropping pattern, marketed surplus and consumption of major inputs and services viz. area under high yielding varieties, irrigated area, fertilizer consumption, farm mechanization, credit, crop insurance etc. . These data have been collected from different sources i.e. Department of Farmers' Welfare and Agricultural Development (Agriculture), Agricultural statistics of Madhya Pradesh and Department of Agril. Statistics of various selected districts.

5.1   Concluding observations

A) The main findings arrived from the analysis of secondary data are as follows.

- The gross cropped area of Madhya Pradesh found to be increased by 2.7 per cent in the year 2009 – 10 (20944 thousand ha) over the year 1999 – 2000 (19194 thousand ha). The area under total kharif crops (12.54%) was increased more as compared to Rabi crops (5.26%). The area under total pulses found to be increased by 23.26 per cent, while the area under cereal and oilseeds decreased by -6.78 per cent and -0.71 per cent. The highest area was found to be increased in maize (510.79%) followed by sesamum (163.50%), tur (106.43%), lentil (37.87%), pea (26.53%), soybean (25.05%), cotton

(21.52%), rapeseed and mustard (16.13%), gram (12.16%) and sugarcane (11.63%). The area under paddy (-8.97%), jowar (- 36.50%), bajra (-74.87%), kodo – kutki (-45.85%), moong (-5.50%), kulthi (-51.22%), niger (-23.97%), linseed (-58.67%) and sunflower (-85.71%) was found to be decreased. The total production of crops in Madhya Pradesh was found to be increased by 14.33 per cent in the year 2009 – 10 (25399 thousand t) over the year 1999 – 2000 (22215 thousand t). The total production of Kharif crops (30.71%) showed higher relative change in total Rabi crops (2.04%). The production of cereal (7.00%) and oilseeds (41.57%) found to be increased, while the production of pulses decreased by 11.61 per cent. As regards to production of major crops, the production of paddy (1.37%), jowar (13.23%), maize (5.51%), bajra (178.42%), wheat (6.22%), urad (60.90%), moong (6.90%), groundnut (37.39%), soybean (42.885), sesamum (474.19%), rapeseed & mustard (31.04%), cotton (140.28%) and sugarcane (3.16%) found to be increased, while the production of kodo – kutki (-35.94%), barley (-1.98%), tur (-24.07%), kulthi (-12.05%), gram (-10.615), pea (-33.00%), lentil (-26.28%), torea (-57.14%), niger (-22.22%), linseed (-64.57%), and sunflower (-100.00%) found to be decreased during the period.

As regards to trends and growth of area, production and productivity of selected crops are concerned:

- The area of wheat in Madhya Pradesh was found to be increased by 6.60 per cent in the current year (4159.37 thousand ha) over the base year (39012.69 thousand ha) with the fluctuation of 4.52 per cent and showed an annual growth of 0.74 per cent per year with the magnitude of 29.91 thousand ha per year. The growth of wheat was found to be positive and significant in major wheat growing districts (2.61 %/year), while it was found negative in other districts (-0.45%/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of area was found to be positive in all the districts except in Harda (-2.15 % /year) district. The growth of wheat was found to be positive and highly significant in Hosangabad (3.79 %/year), Harda (6.15 % /Year), and Datia (6.13 %/ year), while it was positive and significant in Dhar (6.15%/year), and Chhindwara (4.10 % /year) districts. The production of wheat in Madhya Pradesh was found to be increased by 3.84 per cent in the current year (7324.17 thousand t) over the base year (5684.65 thousand t) with the fluctuation of 17.82 per cent and showed an annual growth of 0.74 per cent per year with the magnitude of 249.97 thousand t per year. The growth of production of wheat was found to be positive and significant in major wheat growing districts (4.38 %/year) and also in

other districts (3.31 %/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of production was found to be positive in all the districts except in Vidisha (-0.56 % /year) and Morena (-1.46 % /year) district. The growth of production of wheat was found to be positive and highly significant in Hosangabad (5.66 %/year) and Harda (11.93 % /year), while it was positive and significant in Dhar (9.99% /year). The productivity of wheat in Madhya Pradesh was found to be increased by 8.85 per cent in the current year (1841.67 kg/ha) over the base year (1692.00 kg/ha) with the fluctuation of 5.99 per cent and showed an annual growth of 1.40 per cent per year with the magnitude of 24.80 kg/ha per year. The growth of productivity of wheat was found to be positive and significant in major wheat growing districts (2.01 %/year) and other districts (1.40 %/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of productivity was found to be positive in all the districts except in Sehore (-1.25 % /year), Morena (-1.48 % /year) and Datia (2.36% /year) districts. The growth of productivity of wheat was found to be positive and highly significant in Hosangabad (2.44 %/year), Dhar (5.65% /year) and Harda (7.58 % /Year), while it was positive and significant in Raisen (2.27% /year).

- The area of gram in Madhya Pradesh was found to be increased by 14.40 per cent in the current year (2938.47 thousand ha) over the base year (2568.50 thousand ha) with the fluctuation of 9.50 per cent and showed an annual growth of 2.17 per cent per year with the magnitude of 59.85 thousand ha per year. The growth of gram was found to be positive and significant in major gram growing districts (3.47 %/year), while it was found positive but non-significant in other districts (0.45%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of area was found to be positive in all the districts. The growth of wheat was found to be positive and highly significant in Vidisha (1.49 %/year), Raisen (3.23 % /Year), Dewas (7.74 %/ year), Panna (3.22 %/ year), and Sehore (6.14 %/ year), while it was positive and significant in Sagar (3.58% /year), Shajapur (6.76%/year) and Jabalpur (2.66 % /year). The production of gram in Madhya Pradesh was also found to be increased by 4.15 per cent in the current year (24404.13 thousand ha) over the base year (23424.93 thousand ha) with the fluctuation of 2.87 per cent and showed an annual growth of 2.35 per cent per year with the magnitude of 56.25 thousand ha per year. The growth of production of gram was found to be positive in major gram growing districts (3.65 %/year) and other districts (0.02%/year) of M.P. Amongst different major gram growing districts of

Madhya Pradesh the growth of production was found to be positive in all the districts. The growth of gram was found to be positive and highly significant in Raisen (4.96 % /year), Damoh (9.02 %/ year), Dewas (9.57 %/ year), Sehore (6.39 %/ year) and Panna (9.58% /year), while it was positive and significant in Sagar (6.88% /year). The productivity of gram in Madhya Pradesh was found to be decreased by -0.22 per cent in the current year (874.75kg/ha) over the base year (876.70 kg/ha) with the fluctuation of 0.16 per cent and showed an annual growth of 0.93 per cent per year with the magnitude of 8.15 kg/ha per year. The growth of productivity of gram was found to be positive in major gram growing districts (1.47 %/year) and other districts (0.30%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of productivity was found to be positive in all the districts except Ujjain (-2,08% /year) and Sehore (0.01% /year). The growth of gram was found to be positive and highly significant in Panna (6.09 % /year) district, while was it positive and significant in Dewas district (2.22% /year).

- The area of tur in Madhya Pradesh was found to be increased by 3.46 per cent in the current year (320.70 thousand ha) over the base year (309.97 thousand ha) with the fluctuation of 2.41 per cent and showed an annual growth of 0.70 per cent per year with the magnitude of 2.21 thousand ha per year. The growth of area of tur was found to be positive and highly significant in major tur growing districts (1.62 %/year), while it was found negative and significant in other districts (-0.78%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of area of tur was found to be positive in all the districts except Chhindwara (-2.06% /year), Khandwa (-5.66% /year), Hosangabad (-3.57% /year), and Khargone (-1.60% /year) districts. The growth of area of tur was found to be positive and highly significant in Narshingpur (8.64 %/year), Betul (5.85% /year), Jabalpur (5.99% /year), Seoni (1.93% /year), Rewa (1.48% /year) and Satna (2.33% /year) districts. The production of tur in Madhya Pradesh was found to be decreased by -8.95 per cent in the current year (219.37 thousand t) over the base year (240.92 thousand t) with the fluctuation of 6.62 per cent and yet showed a positive annual growth of 0.79 per cent per year with the magnitude of 1.82 thousand t per year. The growth of production of tur was found to be positive in major tur growing districts (1.42 %/year), while it was found negative and non-significant in other districts (-0.58%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of production was found to be positive in all the districts except Sidhi (-2.63% /year), Khandwa (-4.03% /year), Hosangabad (-

5.54% /year), Khargone (-1.63% /year) and Satna (1.26% /year). The growth of production of tur was found to be positive and highly significant in Narshingpur (7.08 %/year) district, while it positive and significant in Betul (6.33% /year) district. The productivity of tur in Madhya Pradesh was found to be decreased by -13.61 per cent in the current year (698.44 kg/ha) over the base year (808.43 kg/ha) with the fluctuation of 10.32 per cent and showed an annual growth of -0.66 per cent per year with the magnitude of -5.01 kg/ha per year. The growth of productivity of tur was found to be negative in major tur growing districts (-0.31 %/year) and also in other districts (-1.17%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of productivity was found to be negative in all the districts except Chhindwara (2.82% /year), Betul (0.14% /year), Khandwa (1.79% /year) and Seoni (1.10% /year). The growth of productivity of tur was found to be positive and highly significant in Chhindwara (2.82 %/year), while was it was found negative and significant in Raisen (-2.73% /year), Hosangabad (-1.95% /year) and Satna (-3.74% /year) districts.

- The production marketed ratio of all the selected crops showed increasing trend during the period from 2001- 02 to 2009-10 in case of wheat production marketed ratio was found to be increased from 1:0.33 to 1:0.69 revealed that the marketed surplus of wheat increase from 33 per cent (2001-02) to 69 per cent (2009 - 10). The marketed surplus ratio of wheat, gram and tur was also found to increased from 1:0.41 (2001 - 02) to 1:0.56 (2009 - 10) and 1:0.48 (2001 - 02) to 1:0.48 (2009 -10) respectively.

- The area under HYVs of all the crops has been found to be increased by 22.47 per cent in the year 2009-10 over the year 1999-2000 excluding for jowar (-25.18%). The maximum area under HYVs has been noted for wheat (63.10%) followed by paddy (50.42%) and *bajara* (36.99%).

- The fertilizer consumption was also found to be increased by 76.69 per cent in the year 2010 as compared to 2001. Amongst different types of fertilizer the consumption of K-fertilizer showed maximum percentage change (157.14%) over nitrogen fertilizer (78.68%) and phosphoric fertilizer (62.76%).

- The irrigation facilities in Madhya Pradesh have also been increased by 14.93 per cent in the year 2010 over the year 2001. Irrigated area by canal, tube well and wells, other sources has been found to be increased 6.39 per cent, 17.70 per cent and 15.46 per cent respectively, while the area irrigated by tanks found to be decreased by -1.52 per cent

in the year 2010 over the year 2001. The electricity production and road of length has also been increased by 33.48 per cent and 35.04 per cent in the year 2010 over the year 2001.

B) The main finding arrived from the analysis of primary data are as follows:

- An average age of a HH (decision maker) was found to be between 40- 46 years. All the HH were found to be head of their family and opt crop farming as a main occupation for their livelihood. The majority of were from OBC followed by General, SC/ST social group. Their average size of family members was found to be 7-8 comprised of 4 males and 3-4 females. An average HH of the study area operated more irrigated land as compared to un-irrigated land. The total operated holding was found to be higher than the owned land in all the size of farms. The practice of leased in land was found in the area under study. An average HH cultivated 0.03 -2.21 ha of leased in land in cultivation of crops. The practice of leased out land was not found popular in the area under study. The surface/canal followed by tube well irrigation was found to be major sources of irrigation in wheat growers farms (Hosangabad district), whereas tube well /ground water was the main source of irrigation in gram and tur growers' farm. The term of leased in land was found to be on fixed money, which was found to be Rs. 14000 to Rs. 32000 per ha per year according to type of land .Soybean (*Kharif*)and wheat (*Rabi)* as the major crops in which he devoted their major cultivated area of gross cropped area. Paddy , gram , sugarcane and moong were found to be other crops cultivated by farmers of the study area .They found to be obtained the highest yield of sugarcane, followed by wheat , paddy , gram, soybean and moong. In all yield levels were found to be same in all the categories of HHs with minor variations. As far as the level of investment on farm machinery is concerned, an average HH of the study area invested only Rs. 40000- 65000/ha on farm machinery and out of the total investment on machinery investment on tractor was found a major machine followed by tube wells, combined harvester and threshing machine. As for as live stocks are concerned an average HH had only 2 Cattles and 1 buffalo. One other live stock (goat, pig, sheep etc.) was found only in marginal and small farm size of farms.

- The 2.60, 1.49, and 4.09 per cent losses were estimated in harvesting, threshing and total loses in wheat production. The losses occurred in harvesting were found more as compared to threshing in wheat. As the size of farm increased the total per cent losses increased from 3.61 (marginal) to 4.18 per cent (large) in wheat, while it is also found

that 2.69, 1.13, and 3.82 per cent losses were estimated in harvesting, threshing & winnowing and total loses in gram. The losses occurred in harvesting (2.69%) were found more as compared to threshing & winnowing (1.13%) in gram. As the size of farm increased the total per cent losses increased in harvesting from 2.38% (marginal) to 3.13% (large), while decreased in threshing & winnowing of gram from 1.27 (marginal) to 0.98 per cent (large).

- It was found that 2.40, 0.39, 0.23 and 3.02 per cent losses were estimated in harvesting, threshing, winnowing and total losses respectively in tur production. The losses occurred in harvesting (2.40%) were found more as compared to threshing (0.39%) & winnowing (0.23%) in tur. As the size of farm increased the total per cent losses increased in harvesting, threshing and winnowing of from 2.00 per cent (marginal) to 3.02 per cent (large), marginal (0.31%) to 0.50% (large) and 0.18 per cent (marginal) to 0.31 per cent (large) respectively in tur production.

- The losses of grains in wheat, gram and tur in transportation from field to threshing floor were found more than the losses in transportation from farm to market. As the size of farm increased from marginal to large the losses in transportation from field to threshing floor and farm to market was found to be decreased respectively. These losses were found to be same in all the size of farms with minor variations.

- It is observed from the data that the maximum quantity of grains were found to be stored in *pacca* storage followed by *kaccha* storage , gunny bags and steel bin, while the maximum losses were found to be observed in *kaccha* house followed by gunny bag, *pacca* house, and steel bin. As regards to time of storage was concerned in different types of storage structure the maximum time period of storage was found to be in steel bin followed by *pacca* house, gunny bag, and *kaccha* house. The average cost of storage was found to be more in *kaccha* house followed by *pacca* storage, gunny bag, and steel bin. It was also observed during the investigation that none of gram grower used steel bin to store grains and none of the HH received any subsidy to construct additional storage facilities to store grains in their farm.

- On an average size of farm 1.46 per cent, 4.33per cent and 0.26 per cent total losses were found to be occurred in wheat, gram and tur respectively. In different stages the maximum losses of grains were found in storage followed by weighing, transportation and handling. It was also observed that as the size of farms increased the total grains

losses increased in wheat and gram while in tur total losses were found more in small size of farms followed by marginal, large and medium.

- The proportion net availability and the stock of previous year's stock were found to be in ratio of about 9:1 in different size of farms in the area under study.

- An average HH found to be sell their 82.56 per cent (wheat), 88.43 per cent (gram) and 93.14 per cent (tur) of the total production in the market.

- The maximum quantity of wheat was found to be sold in the month of March and April just after the harvest of the crop. It was also observed from the data that more than 90.00 per cent of total marketed surplus had been sold in regulated market/government agencies and remaining 10.00 per cent had been found to be sold to private traders or to agricultural/professional money lenders present in the villages. As the size of holding increased the marketed surplus sold to govt. agencies has been found to be increased and decreased in case of private trader/money.

- An average HH was found to retain 52.3 q of wheat, 7.20 q of gram and 2.95 q of tur for self consumption, seed, feed and other purposes. Out of which the share of seed was found to be maximum followed by family consumption, feed, other and payments in kind . It is also clear from the observation that as the size of holding increases the retention for self consumption decreased, while retention for seed, feed, other and payments in kind increased.

- The marketed surplus of wheat and gram was found more than marketable surplus in different size of farms expect in tur where it was found to be more than marketed surplus in medium and large size of farm and equal in marginal and small size of farms.

- Amongst all the independent variables i.e. operational holding (ha), stock of previous year and yield (kg/ha) gave positive and significant response over marketed surplus. The independent variable like HH size, quantity kept for feed and price also gave positive but insignificant response over marketed surplus, while quantity kept for seed, family consumption, quantity retained for payment in kind (q.), and distance from the mandi gave negative and non significant response over marketed surplus. The fitted function linear multiple regression model for gram was found to be good fit as the coefficient of multiple determinations (R^2) was more than 90 per cent revealed that the fitted function able to explain more than 90 per cent response from these independent variables.

- An average HH sold his maximum marketed surplus in regulated market as compared to unregulated market. A farmer covered an average distance of about 10.00 km, and less than 5.00 km to sell their produce in regulated and unregulated market respectively. The average transportation cost occurred to transport a quintal of grain was found to be ranged between Rs 8 -10/q, which was found to be decreased with size of farms. All the selected HHs reported that their villages have been well connected with *pacca* road. As these entire *pacca* roads were found to be constructed under ***Pradhan Mantri Sadak Pariyojana*** or ***Chief Minister Sadak Pariyojana.***

- The majority of HHs reported that they availed storage/ware houses facilities to store their grains and more than 50 per cent of them reported to have adequate facilities of govt. ware house. The majority of them also reported that they have been alerted about ware house receipt programme and the quality of storage was found to be good in all respect in these warehouses. The cost of storage/ware house was found to be Rs 4.5/q/month to store wheat grains. It is surprise to note that the wheat growers reported that they were aware with all the facilities of ware house provided by govt. but only 15 to 19 per cent was found to be availed these facilities and majority of them sold more than their 80 -90 per cent marketed surplus just after the harvest of the crops. The more than 95 per cent of HHs aware with the minimum support price of wheat declared by Central Govt. and sold their marketed surplus to nearby cooperative societies. The majority of them known MSP as *Society Rate.* As for as future trading of products is concerned only about 5 per cent of HHs reported that they were aware with future trading but none of them used future market. The majority of them do not know the operations and procedures of futures and commodity market. They were not aware with the price risk management and sale possibilities of futures trading also.

- All the farmers were found to be reported to access credit. At overall basis cooperative society was found to be major source of credit followed by private money lender, commercial bank, relative and friend and commission agent. More than 70 per cent of farmer reported that they got credit for Crop cultivation At overall basis more than 60 per cent of respondent reported that they have problem in getting loan from banks and about 85 percent of household have a Kisan card with the average limit of about Rs. 90000/-. As the size of holding increases the number of households investment on crop loan, credit amount and total outstanding and number and limit of Kisan credit card were found to be increased.

- At overall average basis APMC mandi was found to be major source of price information followed by visit to market, buyers in villages, traders , Kisan Call Centre, telephone , print media, radio and cooperative society. The household of different size of farms reported the same percentage with minor variation.

- All the farmers were found to use HYVs of soybean, rice, wheat and gram in their fields. In case of tur and lentil of using HYVs was found to be 86 per cent and 51.50 per cent respectively.

5.2 Policy Implication:

- Although the area of wheat, gram and tur have been found to be increased during the last one decade. But the production of only wheat and gram showed positive trend.

- The production and productivity of tur has been found to be decreased during the last one decade. Hence there is no further scope to increased the area under these crops in the near future, Marketed surplus depends only on the technological breakthrough leading to significant rise in productivity of wheat, gram and tur. Therefore efforts are needed not only for extension of production technologies but also for marketing technologies among the farmers.

- As quantity kept for seed, family consumption, quantity retained for payment in kind (q.), and distance from the mandi gave negative and non significant response over marketed surplus. Hence, efforts should be made to ensured good quality of hybrid/HYVs seed for sowing, enhanced awareness of family planning programme at village level and establishment of more new sub *mandis* of regulated markets particularly at *janpad panchayat* level.

- As less than 5 per cent of HHs reported that they were aware with future trading but none of them about to used commodity exchange market. The majority of them did not know the operations and procedures of futures and commodity market. They also not aware with the price risk management and sale possibilities of futures trading. Hence, efforts should be made to popularize the facilities of future trading at least at block level through conduct of more and more of training regarding these in KVKs, SAUs, etc.

- The majority of farmers were found to use unscientific and non technical methods of storage at their farms i.e. *pacca*, *kaccha* storage structure. Only few of them found to use steel bins. Hence, efforts should be made to make them aware about the methods of storage structure at farm level.

- As only 15 to 20 per cent farmers avail the warehousing facilities and majority of them sale the almost more than 80 per cent marketed surplus immediately just after harvest of the crop having serious implication in the form of handling and storage cost to procurement agencies. Hence, farmers need to encourage opting for farm level storage through helping in creation of efficient storage structure at farm level and taking serious and effective steps for promotion of use of warehouse receipt programme among the farmers.

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EXECUTIVE SUMMARY

In any developing economy; the marketed surplus i.e. the quantity, which is actually made available to the non - producing population of the country of agricultural product plays a significant role., This surplus is more important than the total production of commodities from the marketing point of view. The arrangement for marketing and the expansion of markets have to be made only for the surplus quantity available with the farmers, and not for the total production. The role at which agricultural production expands determines the pace of agricultural development, while the growth in the marketed surplus determines the pace of economic development. An increase in production must be accompanied by an increase in the marketable surplus for the economic development of the country. Through the marketing system is more concerned with the surplus which enters or is likely to enter the market, the quantum of total production is essential for this surplus. The larger the production of commodity, the greater the surplus of that commodity and vice versa. The knowledge of marketed and marketable surplus helps the policy- makers as well as the traders. Price support programs are an integral part of agricultural policies necessary for stimulating agricultural production. The knowledge of quantum of marketable surplus helps in framing these policies. The procurement policy for changing the food grain through the public distribution system has to take into accounts the quantum and behaviour of marketable and marketed surplus. Similarly, the traders have to decide their purchase strategies based on marketed quantities. Advanced estimates of the surplus of such commodity, which have the potential of external trades, are useful in decision related to export and import of the commodity. If surplus is expected to be less than what is necessary the country can plan for import and if surplus is expected to be more than what is necessary, avenues for exporting such a surplus can be explored. The knowledge of marketed surplus helps in developing an adequate capacity of transport and storage system to handle it. With the above considerations in mind, the present study has been formulated in light of three important crops i.e. wheat, gram and tur of Madhya Pradesh with following specific objectives.

1. To estimate marketed and marketable surplus of wheat, gram and tur.

2. To estimate the retention of wheat and rice for consumption, seed, feed, wages and other payments in kind.

3. To examine the role of various factors such as institutional, infrastructural, socioeconomic, etc. in influencing household marketed surplus.

Wheat, gram and tur crops have been selected for assessment of marketed surplus in Madhya Pradesh as these crops had a remarkable position in the state and contributed 11.12% 43.38% and 12.60% in total production of wheat (93.90MT), gram (7.58MT) and tur (8.65MT) of India's production basket.

A multistage sample technique has been used for selection of respondents for the study. At the first stage Hosangabad, Vidisha, and Narshingpur districts has been selected purposively for Wheat , Gram and Tur respectively as these districts are the true representative of the crops having maximum production in the state. At the Second Stage two blocks namely; Powarkheda and Sohagpur, Vidisha and Ganj basoda , and Karakbel and Saikheda were selected purposively from Hosangabad, Vidisha, and Narshingpur districts respectively as these blocks had maximum production of these crops in the districts. Thus, overall 6 blocks were selected from selected districts. Further, two Villages were selected randomly from the list of villages of the selected blocks for the study in third stage. At the last stage, a list of all the growers of the selected villages of respective crops has been prepared and categorized according to their size of holding and 25 respondents have been selected from Marginal (below 1ha), Small (1-2 ha), Medium (2-4ha) and Large (above 4 ha) categories for each crops. Thus, the total sample size for each crop was 100 Households (HHs) and the study comprise of 300 HHs of 6 blocks and 3 districts of M.P.

All the districts (50) of Madhya Pradesh have been divided into major crop producing districts and other districts for analysis of time series secondary data related to the year 1999-2000 to 2009-10. Hosangabad, Dhar, Ujjain, Harda, Vidisha, Raisen, Sehore, Indore, Dewas, Ratlam, Chhindwara, Morena, and Datia districts of M.P. has been selected as major wheat producing districts. These districts contributed 51.60 percent of total production of the state and each districts occupied more than 2.50 per cent share in production of M.P. Apart from these, remaining districts have been considered as other wheat growing districts for the analysis of trend of area, production and yield of the wheat in the state Likewise; Vidisha, Narshingpur, Sagar, Raisen, Damoh, Dewas, Ujjain, Guna, Shajapur, Sehore, Panna, Rajgarh, and Jabalpur districts have been selected as major gram producing districts. These districts had contributed 64.14 per cent of total production of the state and each district occupied more than 2.75 per cent share in production in M.P. Apart from these remaining districts have been considered as other gram growing districts for the analysis of trend of area, production and yield of the gram in the state.

Similarly top tur producing districts viz. Narshingpur, Chhindwara, Betul, Raisen, Khandwa, Sidhi, Jabalpur, Hosangabad, Khargone, Seoni, Rewa, and Satna districts of M.P. have also been selected as major tur growing districts. These districts had contributed 69.78 per cent of total production of the state and each district occupied more than 4.90 per cent share in production in M.P. Apart from these, remaining districts have been considered as other tur growing districts for the analysis of trend of area, production and yield of the tur in the state. The analysis has also been considered for all these 3 crops viz. wheat, gram and tur for M.P. state as a whole for the period under study.

Both primary and secondary data were collected for the study. Primary data were collected from the sample respondents for the study through interview schedule provided by the coordinator of the study. The primary data includes main features of respondents; viz. socio economic profile , land utilization pattern, ownership pattern, cropping pattern, acreage and yield of selected crops and investment pattern, crop losses at different stages of handling, retention of production for home consumption, seed, wages to labours in kind etc. The time series secondary data were collected for the study from the year 1999-2000 to 2009-10. These data have been collected for area, production and productivity of selected crops, cropping pattern, marketed surplus and consumption of major inputs and services viz. area under high yielding varieties, irrigated area, fertilizer consumption, farm mechanization, credit, crop insurance etc. . These data have been collected from different sources i.e. Department of Farmers' Welfare and Agricultural Development (Agriculture), Agricultural statistics of Madhya Pradesh and Department of Agril. Statistics of various selected districts.

5.1   Concluding observations

A) The main findings arrived from the analysis of secondary data are as follows.

- The gross cropped area of Madhya Pradesh found to be increased by 2.7 per cent in the year 2009 – 10 (20944 thousand ha) over the year 1999 – 2000 (19194 thousand ha). The area under total kharif crops (12.54%) was increased more as compared to Rabi crops (5.26%). The area under total pulses found to be increased by 23.26 per cent, while the area under cereal and oilseeds decreased by -6.78 per cent and -0.71 per cent. The highest area was found to be increased in maize (510.79%) followed by sesamum (163.50%), tur (106.43%), lentil (37.87%), pea (26.53%), soybean (25.05%), cotton (21.52%), rapeseed and mustard (16.13%), gram (12.16%) and sugarcane (11.63%). The area under paddy (-8.97%), jowar (- 36.50%), bajra (-74.87%), kodo – kutki (-

45.85%), moong (-5.50%), kulthi (-51.22%), niger (-23.97%), linseed (-58.67%) and sunflower (-85.71%) was found to be decreased. The total production of crops in Madhya Pradesh was found to be increased by 14.33 per cent in the year 2009 – 10 (25399 thousand t) over the year 1999 – 2000 (22215 thousand t). The total production of Kharif crops (30.71%) showed higher relative change in total Rabi crops (2.04%). The production of cereal (7.00%) and oilseeds (41.57%) found to be increased, while the production of pulses decreased by 11.61 per cent. As regards to production of major crops, the production of paddy (1.37%), jowar (13.23%), maize (5.51%), bajra (178.42%), wheat (6.22%), urad (60.90%), moong (6.90%), groundnut (37.39%), soybean (42.885), sesamum (474.19%), rapeseed & mustard (31.04%), cotton (140.28%) and sugarcane (3.16%) found to be increased, while the production of kodo – kutki (-35.94%), barley (-1.98%), tur (-24.07%), kulthi (-12.05%), gram (-10.615), pea (-33.00%), lentil (-26.28%), torea (-57.14%), niger (-22.22%), linseed (-64.57%), and sunflower (-100.00%) found to be decreased during the period.

As regards to trends and growth of area, production and productivity of selected crops are concerned:

- The area of wheat in Madhya Pradesh was found to be increased by 6.60 per cent in the current year (4159.37 thousand ha) over the base year (39012.69 thousand ha) with the fluctuation of 4.52 per cent and showed an annual growth of 0.74 per cent per year with the magnitude of 29.91 thousand ha per year. The growth of wheat was found to be positive and significant in major wheat growing districts (2.61 %/year), while it was found negative in other districts (-0.45%/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of area was found to be positive in all the districts except in Harda (-2.15 % /year) district. The growth of wheat was found to be positive and highly significant in Hosangabad (3.79 % /year), Harda (6.15 % /Year), and Datia (6.13 %/ year), while it was positive and significant in Dhar (6.15%/year), and Chhindwara (4.10 % /year) districts. The production of wheat in Madhya Pradesh was found to be increased by 3.84 per cent in the current year (7324.17 thousand t) over the base year (5684.65 thousand t) with the fluctuation of 17.82 per cent and showed an annual growth of 0.74 per cent per year with the magnitude of 249.97 thousand t per year. The growth of production of wheat was found to be positive and significant in major wheat growing districts (4.38 %/year) and also in other districts (3.31 %/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of production was found to be positive in all the

districts except in Vidisha (-0.56 % /year) and Morena (-1.46 % /year) district. The growth of production of wheat was found to be positive and highly significant in Hosangabad (5.66 %/year) and Harda (11.93 % /year), while it was positive and significant in Dhar (9.99% /year). The productivity of wheat in Madhya Pradesh was found to be increased by 8.85 per cent in the current year (1841.67 kg/ha) over the base year (1692.00 kg/ha) with the fluctuation of 5.99 per cent and showed an annual growth of 1.40 per cent per year with the magnitude of 24.80 kg/ha per year. The growth of productivity of wheat was found to be positive and significant in major wheat growing districts (2.01 %/year) and other districts (1.40 %/year) of M.P. Amongst different major wheat growing districts of Madhya Pradesh the growth of productivity was found to be positive in all the districts except in Sehore (-1.25 % /year), Morena (-1.48 % /year) and Datia (2.36% /year) districts. The growth of productivity of wheat was found to be positive and highly significant in Hosangabad (2.44 %/year), Dhar (5.65% /year) and Harda (7.58 % /Year), while it was positive and significant in Raisen (2.27% /year).

- The area of gram in Madhya Pradesh was found to be increased by 14.40 per cent in the current year (2938.47 thousand ha) over the base year (2568.50 thousand ha) with the fluctuation of 9.50 per cent and showed an annual growth of 2.17 per cent per year with the magnitude of 59.85 thousand ha per year. The growth of gram was found to be positive and significant in major gram growing districts (3.47 %/year), while it was found positive but non-significant in other districts (0.45%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of area was found to be positive in all the districts. The growth of wheat was found to be positive and highly significant in Vidisha (1.49 %/year), Raisen (3.23 % /Year), Dewas (7.74 %/ year), Panna (3.22 %/ year), and Sehore (6.14 %/ year), while it was positive and significant in Sagar (3.58% /year), Shajapur (6.76%/year) and Jabalpur (2.66 % /year). The production of gram in Madhya Pradesh was also found to be increased by 4.15 per cent in the current year (24404.13 thousand ha) over the base year (23424.93 thousand ha) with the fluctuation of 2.87 per cent and showed an annual growth of 2.35 per cent per year with the magnitude of 56.25 thousand ha per year. The growth of production of gram was found to be positive in major gram growing districts (3.65 %/year) and other districts (0.02%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of production was found to be positive in all the districts. The growth of gram was found to be positive and highly significant in Raisen (4.96 %

/year), Damoh (9.02 %/ year), Dewas (9.57 %/ year), Sehore (6.39 %/ year) and Panna (9.58% /year), while it was positive and significant in Sagar (6.88% /year). The productivity of gram in Madhya Pradesh was found to be decreased by -0.22 per cent in the current year (874.75kg/ha) over the base year (876.70 kg/ha) with the fluctuation of 0.16 per cent and showed an annual growth of 0.93 per cent per year with the magnitude of 8.15 kg/ha per year. The growth of productivity of gram was found to be positive in major gram growing districts (1.47 %/year) and other districts (0.30%/year) of M.P. Amongst different major gram growing districts of Madhya Pradesh the growth of productivity was found to be positive in all the districts except Ujjain (-2,08% /year) and Sehore (0.01% /year). The growth of gram was found to be positive and highly significant in Panna (6.09 % /year) district, while was it positive and significant in Dewas district (2.22% /year).

- The area of tur in Madhya Pradesh was found to be increased by 3.46 per cent in the current year (320.70 thousand ha) over the base year (309.97 thousand ha) with the fluctuation of 2.41 per cent and showed an annual growth of 0.70 per cent per year with the magnitude of 2.21 thousand ha per year. The growth of area of tur was found to be positive and highly significant in major tur growing districts (1.62 %/year), while it was found negative and significant in other districts (-0.78%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of area of tur was found to be positive in all the districts except Chhindwara (-2.06% /year), Khandwa (-5.66% /year), Hosangabad (-3.57% /year), and Khargone (-1.60% /year) districts. The growth of area of tur was found to be positive and highly significant in Narshingpur (8.64 %/year), Betul (5.85% /year), Jabalpur (5.99% /year), Seoni (1.93% /year), Rewa (1.48% /year) and Satna (2.33% /year) districts. The production of tur in Madhya Pradesh was found to be decreased by -8.95 per cent in the current year (219.37 thousand t) over the base year (240.92 thousand t) with the fluctuation of 6.62 per cent and yet showed a positive annual growth of 0.79 per cent per year with the magnitude of 1.82 thousand t per year. The growth of production of tur was found to be positive in major tur growing districts (1.42 %/year), while it was found negative and non-significant in other districts (-0.58%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of production was found to be positive in all the districts except Sidhi (-2.63% /year), Khandwa (-4.03% /year), Hosangabad (-5.54% /year), Khargone (-1.63% /year) and Satna (1.26% /year). The growth of production of tur was found to be positive and highly significant in Narshingpur (7.08

6

%/year) district, while it positive and significant in Betul (6.33% /year) district. The productivity of tur in Madhya Pradesh was found to be decreased by -13.61 per cent in the current year (698.44 kg/ha) over the base year (808.43 kg/ha) with the fluctuation of 10.32 per cent and showed an annual growth of -0.66 per cent per year with the magnitude of -5.01 kg/ha per year. The growth of productivity of tur was found to be negative in major tur growing districts (-0.31 %/year) and also in other districts (-1.17%/year) of M.P. Amongst different major tur growing districts of Madhya Pradesh the growth of productivity was found to be negative in all the districts except Chhindwara (2.82% /year), Betul (0.14% /year), Khandwa (1.79% /year) and Seoni (1.10% /year). The growth of productivity of tur was found to be positive and highly significant in Chhindwara (2.82 %/year), while was it was found negative and significant in Raisen (-2.73% /year), Hosangabad (-1.95% /year) and Satna (-3.74% /year) districts.

- The production marketed ratio of all the selected crops showed increasing trend during the period from 2001- 02 to 2009-10 in case of wheat production marketed ratio was found to be increased from 1:0.33 to 1:0.69 revealed that the marketed surplus of wheat increase from 33 per cent (2001-02) to 69 per cent (2009 - 10). The marketed surplus ratio of wheat, gram and tur was also found to increased from 1:0.41 (2001 - 02) to 1:0.56 (2009 - 10) and 1:0.48 (2001 - 02) to 1:0.48 (2009 -10) respectively.

- The area under HYVs of all the crops has been found to be increased by 22.47 per cent in the year 2009-10 over the year 1999-2000 excluding for jowar (-25.18%). The maximum area under HYVs has been noted for wheat (63.10%) followed by paddy (50.42%) and *bajara* (36.99%).

- The fertilizer consumption was also found to be increased by 76.69 per cent in the year 2010 as compared to 2001. Amongst different types of fertilizer the consumption of K-fertilizer showed maximum percentage change (157.14%) over nitrogen fertilizer (78.68%) and phosphoric fertilizer (62.76%).

- The irrigation facilities in Madhya Pradesh have also been increased by 14.93 per cent in the year 2010 over the year 2001. Irrigated area by canal, tube well and wells, other sources has been found to be increased 6.39 per cent, 17.70 per cent and 15.46 per cent respectively, while the area irrigated by tanks found to be decreased by -1.52 per cent in the year 2010 over the year 2001. The electricity production and road of length has

also been increased by 33.48 per cent and 35.04 per cent in the year 2010 over the year 2001.

B) The main finding arrived from the analysis of primary data are as follows:

- An average age of a HH (decision maker) was found to be between 40- 46 years. All the HH were found to be head of their family and opt crop farming as a main occupation for their livelihood. The majority of were from OBC followed by General, SC/ST social group. Their average size of family members was found to be 7-8 comprised of 4 males and 3-4 females. An average HH of the study area operated more irrigated land as compared to un-irrigated land. The total operated holding was found to be higher than the owned land in all the size of farms. The practice of leased in land was found in the area under study. An average HH cultivated 0.03 -2.21 ha of leased in land in cultivation of crops. The practice of leased out land was not found popular in the area under study. The surface/canal followed by tube well irrigation was found to be major sources of irrigation in wheat growers farms (Hosangabad district), whereas tube well /ground water was the main source of irrigation in gram and tur growers' farm. The term of leased in land was found to be on fixed money, which was found to be Rs. 14000 to Rs. 32000 per ha per year according to type of land .Soybean (*Kharif*)and wheat (*Rabi)* as the major crops in which he devoted their major cultivated area of gross cropped area. Paddy , gram , sugarcane and moong were found to be other crops cultivated by farmers of the study area .They found to be obtained the highest yield of sugarcane, followed by wheat , paddy , gram, soybean and moong. In all yield levels were found to be same in all the categories of HHs with minor variations. As far as the level of investment on farm machinery is concerned, an average HH of the study area invested only Rs. 40000- 65000/ha on farm machinery and out of the total investment on machinery investment on tractor was found a major machine followed by tube wells, combined harvester and threshing machine. As for as live stocks are concerned an average HH had only 2 Cattles and 1 buffalo. One other live stock (goat, pig, sheep etc.) was found only in marginal and small farm size of farms.

- The 2.60, 1.49, and 4.09 per cent losses were estimated in harvesting, threshing and total loses in wheat production. The losses occurred in harvesting were found more as compared to threshing in wheat. As the size of farm increased the total per cent losses increased from 3.61 (marginal) to 4.18 per cent (large) in wheat, while it is also found that 2.69, 1.13, and 3.82 per cent losses were estimated in harvesting, threshing &

winnowing and total loses in gram. The losses occurred in harvesting (2.69%) were found more as compared to threshing & winnowing (1.13%) in gram. As the size of farm increased the total per cent losses increased in harvesting from 2.38% (marginal) to 3.13% (large), while decreased in threshing & winnowing of gram from 1.27 (marginal) to 0.98 per cent (large).

- It was found that 2.40, 0.39, 0.23 and 3.02 per cent losses were estimated in harvesting, threshing, winnowing and total losses respectively in tur production. The losses occurred in harvesting (2.40%) were found more as compared to threshing (0.39%) & winnowing (0.23%) in tur. As the size of farm increased the total per cent losses increased in harvesting, threshing and winnowing of from 2.00 per cent (marginal) to 3.02 per cent (large), marginal (0.31%) to 0.50% (large) and 0.18 per cent (marginal) to 0.31 per cent (large) respectively in tur production.

- The losses of grains in wheat, gram and tur in transportation from field to threshing floor were found more than the losses in transportation from farm to market. As the size of farm increased from marginal to large the losses in transportation from field to threshing floor and farm to market was found to be decreased respectively. These losses were found to be same in all the size of farms with minor variations.

- It is observed from the data that the maximum quantity of grains were found to be stored in *pacca* storage followed by *kaccha* storage , gunny bags and steel bin, while the maximum losses were found to be observed in *kaccha* house followed by gunny bag, *pacca* house, and steel bin. As regards to time of storage was concerned in different types of storage structure the maximum time period of storage was found to be in steel bin followed by *pacca* house, gunny bag, and *kaccha* house. The average cost of storage was found to be more in *kaccha* house followed by *pacca* storage, gunny bag, and steel bin. It was also observed during the investigation that none of gram grower used steel bin to store grains and none of the HH received any subsidy to construct additional storage facilities to store grains in their farm.

- On an average size of farm 1.46 per cent, 4.33per cent and 0.26 per cent total losses were found to be occurred in wheat, gram and tur respectively. In different stages the maximum losses of grains were found in storage followed by weighing, transportation and handling. It was also observed that as the size of farms increased the total grains losses increased in wheat and gram while in tur total losses were found more in small size of farms followed by marginal, large and medium.

- The proportion net availability and the stock of previous year's stock were found to be in ratio of about 9:1 in different size of farms in the area under study.

- An average HH found to be sell their 82.56 per cent (wheat), 88.43 per cent (gram) and 93.14 per cent (tur) of the total production in the market.

- The maximum quantity of wheat was found to be sold in the month of March and April just after the harvest of the crop. It was also observed from the data that more than 90.00 per cent of total marketed surplus had been sold in regulated market/government agencies and remaining 10.00 per cent had been found to be sold to private traders or to agricultural/professional money lenders present in the villages. As the size of holding increased the marketed surplus sold to govt. agencies has been found to be increased and decreased in case of private trader/money.

- An average HH was found to retain 52.3 q of wheat, 7.20 q of gram and 2.95 q of tur for self consumption, seed, feed and other purposes. Out of which the share of seed was found to be maximum followed by family consumption, feed, other and payments in kind . It is also clear from the observation that as the size of holding increases the retention for self consumption decreased, while retention for seed, feed, other and payments in kind increased.

- The marketed surplus of wheat and gram was found more than marketable surplus in different size of farms expect in tur where it was found to be more than marketed surplus in medium and large size of farm and equal in marginal and small size of farms.

- Amongst all the independent variables i.e. operational holding (ha), stock of previous year and yield (kg/ha) gave positive and significant response over marketed surplus. The independent variable like HH size, quantity kept for feed and price also gave positive but insignificant response over marketed surplus, while quantity kept for seed, family consumption, quantity retained for payment in kind (q.), and distance from the mandi gave negative and non significant response over marketed surplus. The fitted function linear multiple regression model for gram was found to be good fit as the coefficient of multiple determinations (R^2) was more than 90 per cent revealed that the fitted function able to explain more than 90 per cent response from these independent variables.

- An average HH sold his maximum marketed surplus in regulated market as compared to unregulated market. A farmer covered an average distance of about 10.00 km, and less than 5.00 km to sell their produce in regulated and unregulated market

respectively. The average transportation cost occurred to transport a quintal of grain was found to be ranged between Rs 8 -10/q, which was found to be decreased with size of farms. All the selected HHs reported that their villages have been well connected with *pacca* road. As these entire *pacca* roads were found to be constructed under ***Pradhan Mantri Sadak Pariyojana*** or ***Chief Minister Sadak Pariyojana.***

- The majority of HHs reported that they availed storage/ware houses facilities to store their grains and more than 50 per cent of them reported to have adequate facilities of govt. ware house. The majority of them also reported that they have been alerted about ware house receipt programme and the quality of storage was found to be good in all respect in these warehouses. The cost of storage/ware house was found to be Rs 4.5/q/month to store wheat grains. It is surprise to note that the wheat growers reported that they were aware with all the facilities of ware house provided by govt. but only 15 to 19 per cent was found to be availed these facilities and majority of them sold more than their 80 -90 per cent marketed surplus just after the harvest of the crops. The more than 95 per cent of HHs aware with the minimum support price of wheat declared by Central Govt. and sold their marketed surplus to nearby cooperative societies. The majority of them known MSP as *Society Rate.* As for as future trading of products is concerned only about 5 per cent of HHs reported that they were aware with future trading but none of them used future market. The majority of them do not know the operations and procedures of futures and commodity market. They were not aware with the price risk management and sale possibilities of futures trading also.

- All the farmers were found to be reported to access credit. At overall basis cooperative society was found to be major source of credit followed by private money lender, commercial bank, relative and friend and commission agent. More than 70 per cent of farmer reported that they got credit for Crop cultivation At overall basis more than 60 per cent of respondent reported that they have problem in getting loan from banks and about 85 percent of household have a Kisan card with the average limit of about Rs. 90000/-. As the size of holding increases the number of households investment on crop loan, credit amount and total outstanding and number and limit of Kisan credit card were found to be increased.

- At overall average basis APMC mandi was found to be major source of price information followed by visit to market, buyers in villages, traders , Kisan Call Centre,

telephone , print media, radio and cooperative society. The household of different size of farms reported the same percentage with minor variation.

- All the farmers were found to use HYVs of soybean, rice, wheat and gram in their fields. In case of tur and lentil of using HYVs was found to be 86 per cent and 51.50 per cent respectively.

5.2 Policy Implication:

- Although the area of wheat, gram and tur have been found to be increased during the last one decade. But the production of only wheat and gram showed positive trend.

- The production and productivity of tur has been found to be decreased during the last one decade. Hence there is no further scope to increased the area under these crops in the near future, Marketed surplus depends only on the technological breakthrough leading to significant rise in productivity of wheat, gram and tur. Therefore efforts are needed not only for extension of production technologies but also for marketing technologies among the farmers.

- As quantity kept for seed, family consumption, quantity retained for payment in kind (q.), and distance from the mandi gave negative and non significant response over marketed surplus. Hence, efforts should be made to ensured good quality of hybrid/HYVs seed for sowing, enhanced awareness of family planning programme at village level and establishment of more new sub *mandis* of regulated markets particularly at *janpad panchayat* level.

- As less than 5 per cent of HHs reported that they were aware with future trading but none of them about to used commodity exchange market. The majority of them did not know the operations and procedures of futures and commodity market. They also not aware with the price risk management and sale possibilities of futures trading. Hence, efforts should be made to popularize the facilities of future trading at least at block level through conduct of more and more of training regarding these in KVKs, SAUs, etc.

- The majority of farmers were found to use unscientific and non technical methods of storage at their farms i.e. *pacca*, *kaccha* storage structure. Only few of them found to use steel bins. Hence, efforts should be made to make them aware about the methods of storage structure at farm level.

- As only 15 to 20 per cent farmers avail the warehousing facilities and majority of them sale the almost more than 80 per cent marketed surplus immediately just after harvest

of the crop having serious implication in the form of handling and storage cost to procurement agencies. Hence, farmers need to encourage opting for farm level storage through helping in creation of efficient storage structure at farm level and taking serious and effective steps for promotion of use of warehouse receipt programme among the farmers.

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Coordinator's Comments on the Draft Report

Title of the Draft Study Report Examined: "Assessment of Marketed and Marketable Surplus of wheat, gram and tur in Madhya Pradesh by AERC Jabalpur.

1. **Date of Receipt of the Draft Report:** April 10, 2013

2. **Date of Dispatch of Comments:** June 14, 2013

3. **Comments on the Objectives of the study:** Objectives of the project as mentioned by Ministry of Agriculture, GOI in January 2012 have been followed by report writers.

4. **Comments on the Methodology:**

i. With regard to the Concepts of Marketed and Marketable Surplus particularly on pages eight and nine it may be noted that distress sales is an element which can be added in the identity, the concept of Surplus without considering distress sales may actually be considered to be Marketed Surplus since this concept refers to the *actually marketed* quantities, meanwhile the Net Surplus can actually be specified as the concept of Marketable Surplus since it refers to the idea of consumption as the quantities *actually required for consumption* not the quantities actually retained for consumption, thus here distress sales are considered and buybacks or repurchases are subtracted whereas in the Gross Concept of Marketed Surplus there is no consideration of Repurchase quantity. The above concept may be used in elaborating the relation between Marketed and Marketable Surplus as on page 4 using the concept of distress sales. A more detailed description of the concept is in the Attached Sheet.(Final Analytical and Accounting Concept of Marketed Surplus.doc)

ii. Literature Review on pages fifteen to seventeen should have more on some description of earlier theoretical work on Marketed Surplus like Raj Krishna and Behrman as also some International contemporary literature.

iii. A table on State wise share of selected foodgrain crops in India in a recent year may be given to describe the Overall National picture before going into state detail in Chapter 2.

iv. In Chapter 1 there should be more elaboration of concepts used, specifically more emphasis should be given on factors affecting marketed surplus which concept is later used both for regression and descriptive tables in Chapter 4, specifically page 76-77.

v. Although table 4.1 on page 50 gives some information on the selected districts a much more detailed table giving information like source of irrigation, occupation of farmers, yield of crops, farm machinery used and proportion of sold production (not exact but

obtained through informal questioning), this information should be provided at the early stage of the report which would have been obtained through informal questioning by the surveyors in the districts and villages surveyed, this informal information obtained by the surveyor could be given .

vi. The Empirical Analysis part in page 76-77 in Chapter 4 cannot be faulted for level of detail and clarity however it may be noted that in the case of Determination of Factors Affecting Marketed Surplus Regression a testing for Problems of Heteroscedasticity may be in order and help in getting more specified and significant relationship.

5. Comments on the Presentation, Get up etc.: Acceptable.

6. Overall View on Acceptability of the Report: Acceptable after comments on methodology taken into consideration.

Annexure –II

Action Taken Report on Coordinator's Comments

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Action Taken: Incorporated as suggested

ii. Literature Review on pages fifteen to seventeen should have more on some description of earlier theoretical work on Marketed Surplus like Raj Krishna and Behrman as also some International contemporary literature.
Action Taken: Incorporated as suggested
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Action Taken: Incorporated as suggested
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Action Taken: Incorporated as suggested

3. **Comments on the Presentation, Get up etc.:** Acceptable.

4. **Overall View on Acceptability of the Report:** Acceptable after comments on methodology taken into consideration.

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