Assessment of marketable and marketed surplus of Major crops in Morena District of Madhya Pradesh

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by

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CERTIFICATE – I

This is to certify that the thesis entitled **"Assessment of marketable and marketed surplus of Major crops in Morena District of Madhya Pradesh"** *submitted in partial fulfilment of the requirements for the Degree of* **DOCTOR OF PHILOSOPHY***in* **AGRICULTURE** *in the* **Department of Agricultural Economics** *of Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior is a record of the bona-fide research work carried out by***KIRAN SHARMA***under my guidance and supervision. The subject of the thesis has been approved by the Student's Advisory Committee and the Director of Instructions.*

No part of the thesis has been submitted for any other degree or diploma or has been published. All the assistance and help received during the course of this investigation has been acknowledged by the scholar.

(Dr. A.M. Jaulkar)
Chairman of the Advisory Committee

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This is to certify that the thesis entitled **"Assessment of marketable and marketed surplus of Major crops in Morena District of Madhya Pradesh"** *submitted by* **KIRAN SHARMA** *of the Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior in partial fulfilment of the requirements for the degree of* **DOCTOR OF PHILOSOPHY** *in* **AGRICULTURE** *in the* **Department of Agricultural Economics** *has been accepted after evaluation by the External Examiner and approved by the Student's Advisory Committee after an oral examination of the same.*

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Place: ……..

External Examiner

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Place: Gwalior

Date: …/..../2021 **(Kiran Sharma)**

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Chapter - I
INTRODUCTION

Agriculture plays a vital role in Indian economy. Agriculture along with fisheries and forestry accounts one-third of the nation's Gross Domestic Product (GDP) and its single largest contributor. Agricultural exports constitute a fifth of the total exports of the country. In view of the predominant position of Agricultural sector, collection, maintenance of Agricultural Marketed and Marketable Surplus of food grains assume great importance. In any developing economy, the Marketed Surplus or Producer's Surplus of agricultural product plays a significant role. The marketed surplus is, hence, as vital as total production in influencing market prices. It is, hence, vital to have reliable estimates of marketed surplus and recognize vital determinants of marketed surplus to design suitable production, procurement, storage, distribution and pricing policies.The entire amount of marketable surplus, which is available for sales, may not be actually sold in the market. Therefore, marketed surplus may be more, less or equal to the marketable surplus, depending upon the socio-economic conditions of the farmers, type of the crop, access to market, etc. Since marketed surplus represents actual sales by farmers, the difference between marketable and marketed surplus can reveal several patterns of sale, purchase and stockholding by various categories of farmers. If marketable surplus is higher than marketed surplus, it indicates that stocks are held by farmers who have better retention capacity in anticipation of fetching higher prices in future period or sometimes during emergencies (Acharya and Agarwal, 2004).

On the other hand, if marketed surplus and marketable surplus are equal, it indicates that farmers are not in a position to hold back their stocks as they need cash for the next crop or other purposes. The marketed surplus is higher than marketable surplus when the farmer retains a smaller quantity of the crop than actual requirements for family, farm and other needs. The concept of marketed surplus has been used in different ways, and it is necessary to define precisely the term. In some of the earlier studies on food grains marketing in the developing countries, three concepts of marketed

surplus have been used; gross marketed surplus, net marketed surplus and marketable surplus. For the purpose of this study, the marketable surplus has been estimated by subtracting total retention from total production. 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.

The agricultural marketing system plays a dual role in economic development of India where 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 profits are the maximum, subject to socio – cultural, ecological and economic constraints. The marketing system transmits the crucial price signals. 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. 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.

In India total area under mustard, wheat, pigeonpea and bajra crop during 2017-2018 were 6073.8 thousand hectares, 29580 thousand hectares, 5387 thousand hectare and 7400 thousand hectares, respectively with total production of 7917.2 thousand tonnes, 9970 thousand tonnes, 4599 thousand tonnes and 9130 thousand tonnes, respectively and productivity of 1304 kg $ha^{-1,}$ 3371 kg $ha^{-1,}$ 771.107 kg ha^{-1} and 1237 kg $ha^{-1,}$respectively. In Madhya

Pradesh total area under mustard, wheat, pigeonpea and bajra crop during 2017-2018 were 708 thousand hectare, 690 thousand hectare, 2911 thousand hectare and 310 thousand hectare, respectively with total production of 920 thousand tonnes, 768 thousand tonnes, 782 thousand tonnes and 760 thousand tonnes, respectively and average productivity were 1299 kg ha^{-1}, 2993 kg ha^{-1}, 1025.119 kg ha^{-1} and 2435 kg $ha^{-1,}$respectively. In Morena District area under mustard, wheat, pigeonpea and bajra crop during 2017-2018 were 147 thousand hectare, 75 thousand hectare, 15 thousand hectare and 141.10 thousand hectare respectively with production of 336 thousand tonnes, 350 thousand tonnes, 20 thousand tonnes and 361 thousand tonnes respectively and productivity of 2311 kg ha^{-1}, 4000 kg ha^{-1}, 1053 kg ha^{-1} and 2550 kg ha^{-1} respectively.

In the illumination of above the current study entitled, “Assessment of marketable and marketed surplus of Major crops in Morena District of Madhya Pradesh" was accepted out with the following objectives:

Specific objectives

1. To study the compound growth rate of area, production and productivity of selected crops in Morena district.
2. To estimate the marketable and marketed surplus of selected crops in Morena.
3. To estimate farm retention for consumption seed, feed, wages and other payments in kind.
4. To examine factor influencing marketable and marketed surpluses.
5. To examine the problem faced by farmers in marketing and their suggestion.

Scope of the study

The Indian farming community was always suffered from investment and return uncertainty. This study deals with the economics of both the production and marketing of selected crops. In view of the predominant position of Agricultural sector, collection, maintenance of Agricultural Marketed and Marketable Surplus of food grains assume great importance. In any developing economy, the Marketed Surplus or Producer’s Surplus of

agricultural product plays a significant role. The findings concerning for 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.

Limitation of the study

The research studies in social sciences have to face some limitations and the present research study is no exclusion. The study has been conducted by a on your own student researcher with under mentioning limitations:

- The study was confined only to Morena district of Madhya Pradesh and the investigation work was confined to only 20 Villages of four Blocks of Morena district.
- Due to lack of time and resources, it was not possible to cover a large area in the study. Therefore, the data was based on a sample of 320 respondents.
- The findings are based on the verbal expressions and responses of the farmers and the individual biases of the respondents at points might have prevailed despite that much care taken to check such occurrence.
- The study was approved out within the common limitations of time, money and other resources of a particular student project. It may not fulfill all the prospect of a scientific research project.
- The selection of variables is rather arbitrary through based on relevant logic, past research findings and judgment of the subject matter experts.
- The conclusion arrived are based on the original measurement with the simple association and may not sound for prediction purpose.

- The study was confined to Morena district and the result found are based on the information provided by the respondents and could not be generalized.

Organization of the study

- The study is organized into six chapters. Chapter I deal with the problems and set of objectives, its significance and limitation of the work.
- A review of work done in this direction been presented in a few sections under chapter II had direct relevance to the results and discussion.
- The methodology adopted being elaborated in chapter III, it presents a brief account of research design using a procedure of sampling and the technique of research used to collect the facts and required analysis of raw data to conclude.
- Chapter IV presents the results and cases observed in Assessment of marketable and marketed surplus of Major crops in Morena District of Madhya Pradesh.
- Chapter V provides a discussion on findings of the study and other relevant aspects of Assessment of marketable and marketed surplus. The chapter also provides an analysis of the experiences of respondents.
- Chapter VI presents the summary and conclusions of the study. The dissertation also provides an exhaustive list of references and interview schedule used for data collection. Appendices had their place at the end of this report.

Chapter - II

REVIEW OF LITERATURE

The review of the literature about the related studies conducted in past is of paramount importance. This give sound support to any noble research, it helps in defining the problem, formulating the objectives, deciding the methodology and discussing the findings. An attempt has been made here to review the available relevant literature having a direct or indirect bearing on the present study.

The review of literature has been presented under the following subheads:

2.1 Compound growth rate of area, production and productivity of selected crops in Morena district.

2.2 Estimate the marketable and marketed surplus of selected crops in Morena.

2.3 Estimate farm retention for consumption seed, feed, wages and other payments in kind.

2.4 Factor influencing marketable and marketed surpluses.

2.5 Problem faced by farmers in marketing and their suggestion.

2.1:Compound growth rate of area, production and productivity of selected crops in Morena district

DMI (2002) conducted a study on marketable surplus and post harvest losses of paddy. The survey conducted during TE 1998-99 covered 100 districts selected from 25 states of India. The State-wise distribution of area under paddy showed that in states like Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Punjab, Haryana, paddy was grown mainly as irrigated crop. The coverage of the High Yielding Varieties was of the order of 77.19 per cent. In total paddy production irrigated paddy and High Yielding Varieties contributed 75.89 per cent and 85.56 per cent, respectively. The total requirement of

paddy for farm-family consumption was estimated at 33.67 per cent of the estimated production. The estimates of retention for various purposes and purchases of paddy to meet the total requirement of farm-family like farm-family consumption, for consumption by permanent and temporary labour, estimated purchases for consumption, for seed purpose, for animal feed and for payment in cash and kind were worked out at 26.08, 2.22, 5.38, 1.80, 0.18 and 1.54 per cent, respectively. The total post harvest losses of paddy at producers' level were estimated at 2.72 per cent of the total production. The total marketed surplus was estimated to be 51.97 per cent. The share of direct sales by the producers to consumers was 3.64 per cent. The co-operatives purchased only 3.90 per cent and share of FCI was merely 9.73 per cent. The study stressed upon the need to open up avenues through marketing reforms for promoting direct sales by the producer to the target group in order to enhance producer's share in consumer's rupee. Development of infra-structure and facilities at the village level to serve the interests of the farm households were of utmost important as 64.66 per cent of total sales were within villages. Study suggested shifting the focus of development from the urban market centres (largely developed) to the rural market centres.

Chauhan and Chhabra (2005) conducted a study on production, marketed surplus, disposal channels, margins and price-spread for maize cultivation in the Hamirpur district of Himachal Pradesh. A multi-stage stratified sampling technique was used to select the sample of blocks (2), villages (10) and maize growers (120) for the year 2001-02. The study on factors affecting marketed surplus, and cost & margins in the marketing of maize revealed that farm-level marketable surplus was comprised of 53.21 per cent of the total production. The practices of storing maize for some time and selling at a later date for higher price led to storage losses to the extent of 0.16 quintal (2.80 per cent of marketable surplus). Much of the marketable surplus of maize (66.92 per cent) was disposed of by a majority of farmers (74.56 per cent) during the first quarter (October- December). Producer, local trader, processor/ consumer were found as the main channel in the marketing of maize followed by about 71.93 per cent farmers, accounting for about 70

per cent of the produce. The producer's share in consumer's rupee was estimated at 78.01 per cent in this channel.

Chauhan and Kumar (2010) concluded that about (63%) of the total maize cultivated area was under high yielding varieties (HYV) and remaining (37%) area was still under traditional local varieties. The total area under maize, both HYVs and local, showed positive relationship with size of holdings. The study also observed that irrigation played an important role in the enhancing maize production and productivity of both local and HYVs. The marketable surplus of maize estimated at 48% was mostly (72 to 83%) disposed off in second quarter (December-February) due to inadequate storage structure at the farmers level and fear of its spoilage due to attack of insect pests. Results show that production was most dominant and significant factor in determination of magnitude of marketed surplus.

Singh *et al.* (2012) examined the marketed surplus of rice in Bishnah Block of Jammu District increased with increasing size of farms and varied from 5.1 qt in the first size group to 26.67qt for the large size group with an overall average of 11.57 qt. It is quite clear that the marketed surplus increases with the increase in the size of farms. The marketed surplus by different size of farms was worked out as 48.09, 58.20, 62.37 and 57.94 per cent of the total production for small, medium, large and all farms, respectively. The percentage contribution by each size of farms in total marketed surplus was 9.31, 26.88 and 53.81 per cent, respectively, for small, medium and large size of farms. The proportion of sale to total production was observed as 48.09, 58.20, 62.37 and 57.94 per cent for small, medium, large and all farms, respectively.

Pandey et al. (2013) studied the marketable and marketed surplus of chickpea in Satna District of Madhya Pradesh during agricultural year 2008-09. Primary data were collected by used suitable sampling technique. The secondary data were collected from the different sources i.e. from agricultural statistics of M.P. Total sample size was categorized according to land holding viz. small (0-2 ha), medium (2-4 ha) and large (4 and above ha). In addition for each category marketed and marketable surplus were calculated. 10

wholesalers and 10 retailers were also randomly selected from trading in Satna district. Area under chickpea was 1.72 ha,(2008-09) which contributed 26.91% of gross cropped area. Under the methodology multiple linear regression were used for evaluating the percent contribution of different recourses on marketed surplus. Lack of knowledge of recommended practices was the first and foremost constraint faced by the producers i.e. 69.00 per cent. Some suggestions for formers and some for government were given for policy making strategy.

Abid *et al.* (2014) reported that the results show that area, production and yield of maize was increased over the time the reason is that more area was brought under hybrid and improved 0pen pollinated maize varieties. The area under rice crop has decreased whereas their production increased due the corresponding increase in per hectare yield of rice crop. It was revealed from the results that area, production and yield of sugarcane crop was increasing at a rate of 0.24 percent, 0.85 percent and 0.60 percent per annum, respectively.

Konar and Dey (2018) found that in Burdwan District area and production of rapeseed and mustard have recorded negative compound growth rate to the extent of 3.50 and 3.53 percent per annum respectively over a period of 11 years from 1999-2000 to 2010-11. But growth rate of productivity of this crop is noted to be 0.05 percent in the district. Compound growth rate of area, production and productivity of this crop in West Bengal are 0.17, 1.00 and 0.32 percent per annum respectively in same period of time.

Singh *et al.* (2018) studied the growth in terms of area, production and productivity of Wheat crop in Azamgarh division of eastern Uttar Pradesh. The growth was examined by linear growth rates and compound growth rates for the study period of 2000-01 to 2014-15.

Singh *et al.* (2018) studied the growth in terms of area, production and productivity of wheat in Varanasi division of eastern Uttar Pradesh. The

growth was examined by linear growth rate (LGR) and compound annual growth rate (CAGR) for period 2000-01 to 2014-15.

Nimbrayan and Bhatia (2019) examined the instability in the area, production and productivity of barley crop in India and Haryana during three phases i.e. pre-green revolution, green revolution and post green revolution period. The study is based on secondary data and used three analytical methods. The results showed that in case of area, the instability is more in the post-green revolution than pre-green revolution period as the focus of the green revolution was mainly on other crops like rice and wheat. In case of production, instability showed a decreasing trend from pre- to post-green revolution period due to the adoption of new technology and good quality seeds during the green revolution. A same decreasing trend was observed in yield instability also. In case of growth pattern, the area in Haryana and India both shows a negative growth trend in the pre-green revolution. In case of production, in Haryana, negative growth trends were observed in the green revolution period but in the post-green revolution, it was positive growth; while in India as a whole growth rate was negative. In case of yield, the growth rate was positive in both Haryana and India.

Singh et al. (2020) analyzed the growth rate for Area, Production and Productivity of Rice crop in Varanasi Division of Eastern Uttar Pradesh. The time series data on area, production and productivity of wheat crop pertaining from “Sankhyakiya Patrika” to the period 2000-01 to 2014- 15 were used for the study. The per cent change was estimated on the basis of triennium average for area, production and productivity which is increased substantially with 5.19, 15.90 and 10.20 per cent respectively. Graphical presentations have shown the trends in area, production and productivity of Rice. The growth rate was examined by Compound Annual Growth Rate (CAGR), which is 0.307 per cent for area, 1.559 per cent for production and for its productivity 1.247 per cent. Decomposition analysis shows the dominant effect of productivity for the growth in rice production.

2.2: Estimation of marketable and marketed surplus of selected crops in Morena

Khadase et al. (2001) estimated the marketable and marketable surplus of kharif jowar in 1997-98 in different size group of holdings. Total marketable surplus (production retentions) was estimated at 3.84 quintal, while total marketed surplus (actually sold) was 3.89 quintal. Total marketed and marketable surplus had a positive relationship with the size of holdings, while retentions for in-kind payment and home consumption had a negative relationship with the size of holdings. Production was the major factor that increased the marketable surplus of jowar.

Acharya (2004) estimated quantity of marketed surplus of individual agricultural products or product groups and changes there in during fifty years i.e.1950-51 to 1999-200. He found that during this period marketed surplus and market surplus-output ratio for rice, wheat, cereals, food grains, oilseeds etc. have gone up tremendously. For wheat, marketed surplus estimated at 46.4 tonnes for 1999-2000, an increase of 23.42 percent as compared to 1.9 million tonnes in 1950- 51. Similarly, marketed surplus of rice moved up from 6.2 million tonnes in 1950-51 to 53.8 million tonnes in 1999-2000. For food grains as a whole, marketed surplus estimated at 124.6 million tonnes for 1999-2000 as against only 15.4 million tonnes for 1950-51.

Chauhan and Chhabra (2005) conducted a study on production, marketed surplus, disposal channels, margins and price-spread for maize cultivation in the Hamirpur district of Himachal Pradesh. A multi-stage stratified sampling technique was used to select the sample of blocks (2), villages (10) and maize growers (120) for the year 2001-02. The study on factors affecting marketed surplus, and cost & margins in the marketing of maize revealed that farm-level 10 marketable surplus was comprised of 53.21 per cent of the total production. The practices of storing maize for some time and selling at a later date for higher price led to storage losses to the extent of 0.16 quintal (2.80 percent of marketable surplus). Much of the marketable surplus of maize (66.92 percent) was disposed of by a majority of farmers (74.56 percent) during the first quarter (October- December). Producer, local

trader, processor/ consumer were found as the main channel in the marketing of maize followed by about 71.93 per cent farmers, accounting for about 70 per cent of the produce. The producer's share in consumer's rupee was estimated at 78.01 per cent in this channel.

Alam and Afruz (2010) studied the marketable and marketed surplus of some leading crops in Bangladesh. Authors suggests that marketed surplus as percentage of total production was found highest in potato (64 per cent) followed by lentil (59.5 per cent), Boro paddy (57.5 per cent), mustard (52.7 per cent), Aman paddy (48 per cent), Aus paddy (38 per cent) and wheat (14 per cent). Small farmers were the large suppliers of agricultural produce during harvest time and sell out crops to meet out their cash obligation when the prices remain low. Price elasticity of marketable surplus as estimated for Aman paddy, Boro paddy, Wheat, Potato and Mustard appeared 1.89, 2.7, 1.23, 2.46 and 1.40 respectively, i.e. prices significantly influenced marketable surpluses of these crops. In general, marketable surpluses of crops reflect farmers' well-being. So, price policy influencing output prices had important role in increasing marketable and marketed quantities. Author suggested some policy options based on research findings which should help the policy makers to adopt appropriate measures to increase marketed surplus in Bangladesh agriculture leading to a gradually commercialized agriculture.

Baba et al. (2010) studied the marketed surplus and price spread of vegetables in Kashmir valley. On an average, producers' marketed surplus has been found more than 92 per cent of the total production of selected vegetables. The estimates of regression function had revealed that the production, area under improved varieties, net price received by producers and education level are the significant and positive determinants of marketed surplus, while spoilage at farm level and consumption have shown a negative contribution. The price spread of vegetables with respect to various marketing channels has indicated that the producers' share had an inverse relationship with the number of intermediaries. The net price received by the producers is relatively higher in the channels in which the produce is directly sold to the consumers or retailers. The study had suggested that the coverage of

technology mission should be expanded to other niche areas of vegetable cultivation. The study had also highlighted the needed effective measures to reduce marketing losses at various stages. Study had emphasized on the strengthening of institutions, establishment of processing units and development of market infrastructure in the area.

Jabbar (2010) studied the empirical estimation of marketed surplus of Bangladesh. The empirical studies on marketed surplus of rice had been reviewed with a focus on the concepts and methods used, their strengths and weaknesses, and some recommendations have been made to improve estimation methodology in future studies. Further stated that the understanding marketed surplus and marketing behavior of producers helps design technology, policy and institutions to facilitate the process of commercialization of agriculture.

Chauhan and Kumar (2010) concluded that nearly one half of the marketed surplus was mostly disposed off in second quarter (December–February) due to inadequate storage facilities at farmers level and occurrence of the post harvest losses by insect pests attack during storage. The total post harvest losses of maize estimated at the producer level were to the extent of 3.13 percent.

Amruta and Darji (2011) estimated the marketable and marketed surplus of red gram and identify the factors influencing them in Vadodara district of Gujarat. They were collected from 120 red gram growers spread over 10 villages of Karjan taluka during 2007-08. They used Multiple Regression technique to quantify the effect of the factors influencing marketable and marketed surplus. They observed that the red gram is market oriented crop, about 86 per cent of total production on an average was the marketable surplus and 77 per cent was marketed surplus. The results retreated that marketable surplus was positively and significantly related with cropped area and average productivity in all the four categories of farms. It was negatively related with family size and quantity retained for wages in kind indicating inverse relationship between extent of marketable surplus and these factors. Further, in case of marketed surplus, the examination of

individual coefficients revealed that marketed surplus was positively and significantly related with total production, current prices and financial obligation for samples a whole while the family size showed negative sign indicating inverse relationship of marketed surplus with family size in sample farms.

Borate *et al*. (2011) estimated marketable and marketed surplus of red gram and identified factors influencing surplus in Vadodara district of Gujarat. The author used data collected by him from 120 red gram growers spread over 10 villages of Karjan taluka during 2007-08. A multiple regression technique was applied to gauge effect of various factors influencing marketable and marketed surplus. Results show that marketable surplus was positively and significantly related with cropped area and average productivity in all the four categories of farms. It was negatively related with family size and quantity retained for wages in kind indicating inverse relationship between extent of marketable surplus and these factors. An examination of individual coefficients revealed that marketed surplus was positively and significantly related with total production, current price and financial obligations while family size showed negative sign indicating inverse relationship of marketed surplus with family size on sampled farms.

Sudhakar et al. (2011) conducted micro level study of marketed and marketable surplus of rice in Bihar. They concluded that both, marketed and marketable surplus increased with increase in the size of land holdings and with quantum of rice production. The ratio of marketable and marketed surplus to production of rice also increased with increase in the size of holdings. Rice is main staple food crop which is grown for home consumption. Hence, marketed surplus found lower than marketable surplus in all the categories of households because farmers prefer to keep part of rice production for consumption purpose and like to keep more quantity as there is no guarantee of good harvest in the next season. The study emphasized on an urgent need to initiate risk mitigating arrangement in Bihar in order to increase marketed surplus of rice.

Sandhu (2011) percentage of marketable surplus was found lower in case of large farmers (80.85%) who paid their wages in kind to labours and artisans. On the other hand, share of marketable surplus was observed higher for small farmers (90.85%). It revealed larger marketed surplus in case of small farmers than other category farmers due to their immediate cash requirement.

Singh *et al*. (2011) estimated the extent and pattern of marketed surplus and home utilization of wheat on farm households in Punjab. The analysis of monthly records in this respect of cross section data collected under Comprehensive Scheme to Study the Cost of cultivation of Principal Crops revealed that 7.69, 3.17, 2.41, and 2.28 per cent of the total wheat output was utilized at home as food, animal feed, seed and kind payments, respectively. The output elasticity of marketed surplus which was found out to be positive and more than unity indicated that in state the marketed surplus of wheat grew faster than the increase in production. In contrast to the official records indicating only 62 per cent of total wheat produced in state as market arrivals, the study indicated that marketed surplus constituted about 82 per cent of the wheat produced on sample farm households, thus clearly indicating that a significant proportion of marketed surplus was disposed of without entering the state records, resulting in loss to the state exchequer through evasion of market fee, rural development fund and other taxes.

Grover *et al*. (2012) conducted study on assessment of marketable and marketed surplus of major food grains in Punjab. The present study has been taken to estimate marketed surplus and retention of wheat andrice for self consumption, seed, feed, wages and other payments in kind. Further it examines the role of various factors such as institutional, infrastructural, socio-economic, etc. in influencing household marketed surplus of these crops.Total retention of paddy on samplefarms on an average accounted for 0.64 per cent of farm production. Purpose-wise the home consumption, payment in kind, feed and seed accounted for 0.24, 0.22, 0.09 and 0.08 per cent of paddy production, respectively. Total retention of wheat on sample farms on an average accounted for 9.95 per cent of farm production. Purpose-

wise the home consumption, seed, feed and payments in kind accounted for 6.26, 1.52, 1.61 and 0.14 per cent of wheat production, respectively. In both crops the percentage share of total as well as purpose-wise retention in total farm production declined with the increase in farm size. The marketed surplus accounted for 99.37 and 90.06 per cent of the paddy and wheat output, respectively. Among factors affecting themarketed surplus, size of the operational area, crop farming as main occupation and education had a positive relationship with the marketed surplus.

Pandey et al. (2013) determined the marketable and marketed surplus of chick pea in Rewa district of Madhya Pradesh for the agricultural year 2008-09. The study revealed that marketed surplus was positively, significantly and highly correlated with the total production, followed by size of land holding, income from other sources, size of family, yield/ha and numbers of permanent labours. Authors found that distance from Mandi had no significance with any variable and negative effect on marketed surplus. Authors suggested that rate of chickpea should be decided before crop season, improvement in transportation facility and demonstration by Government.

Sashimatsung et al. (2013) studied the marketable surplus and price spread of tomato in Mokokchung district of Nagaland for the period June-September 2011. Study revealed that the marketable surplus was 206.69 quintals (91.23%) after retaining 19.85 quintal (8.78%) for family consumption, religious payment and gift to friends and relatives while marketed surplus was 196.83 quintal (86.88 %). Losses due to mishandling, breakage and spoilage were 4.35 per cent. Authors suggested that marketing loan, education facilities, roads and transport, soil testing, market information on price and arrival, and measures to prevent pre-harvest losses due to insects/pest and climate may help in increasing marketing efficiency of tomato.

Kumar et al. (2015) accessed the marketable and marketed surplus of paddy in relation with farm size. The marketable and marketed surplus as the percentage of paddy production was 77 and 74 per cent respectively on average of all the farms. The percentage of quantity for family consumption

was also reduced with increase in farm size. The quantity of marketable surplus both in absolute and percentage term increased with increase in the farm size. The quantity of marketed surplus increased in the absolute terms but reduced in percentage term with the increase in farm size.

Prusty and Tripathy (2015) estimated the marketable and marketed surplus of milk in organized and unorganized sector in Cuttack district of Odisha. Study revealed that average production, consumption, marketed surplus were 49.45, 4.96, 44.49 litres in organized and 46.97, 5.21, 41.76 litres per day per household in unorganized sector respectively. Their study suggested that for getting marketing benefit, remunerative price with regular payment to the farmers is needed.

Sharma (2016) undertaken a study to assess the marketed and marketable surplus of rice and wheat, major cereals, in leading producing states and examine important factors, which determine the level of marketed surplus on various categories of farm households. These trends clearly indicate that the government has almost a monopsony in rice and wheat procurement and restricted the participation of private sector. The results of marketed surplus show that about 78 per cent of total rice production was sold in the market and varied from about 63 per cent on marginal farms to about 81 per cent on medium and larger farms.

Sahu et al. (2017) investigated the marketable and marketed surplus of mustard in Gwalior district of Madhya Pradesh by taking 90 samples farmers. The study revealed that marketable surplus generated was 1075.9 quintals by large farmers, 831.38 quintals by medium farmers and 186.75 quintals by small farmers and the marketed surplus generated was 1026(86.72%) quintals by large farmers, 852.63 quintals (92.11%) by medium farmers and 198 quintals (97.53%) by small farmers. Small farmers reported higher marketed surplus i.e. 97.53% followed by medium 92.11% and large size farmers 86.72% The study suggested that marketing loan should be taken to avoid distress sell and some policy options based on research findings which should help the policy makers to adopt appropriate measures to increase marketed surplus.

Balai et al. (2018) reported that the average production wheat per farm to be 42.78 quintals. Among the total production of wheat on an average 12.02 quintal (28.10% of total production) was utilized as family requirement to total production. For family requirement, the quantity of wheat retained by size group wise data shows that the small farmers retained wheat for consumption requirement is lowest i.e. 7.08 quintal per farm which is the highest proportion (34.93% of total production of small farmers) in comparison to other size group. It can be concluded that overall, on an average 28.10 per cent of the total wheat produce was utilized for various consumption purpose and remaining 71.90 per cent of the produce remained as marketable surplus. The data also showed that among the all size of farmers, the percentage of wheat consumption to total available wheat was found to decrease with increase in size of holding and marketable surplus of wheat increase with increase in size of holding.

Islam (2019) assessed the marketable and marketed surplus of selected seasonal fruits (mango, jackfruit, and litchi) in the Chittagong hill tracts of Bangladesh. Primary data were used for the study. In total, 459 sample fruit growers were selected purposively for the study. Proportionate random sampling was followed in case of selecting the sampling unit. It was apparent to interpret from the survey that in case of mango production, 78% fruit grower planted Rangui variety whereas Amrapali was ranked second highest (36%) including the eight groups of Bandarban and Rangamati of the survey. Among the three mentioned varieties of litchi, BARI litchi 2 variety was more prevalent (21%) than the other varieties. Also 69% respondent grew jackfruit whereas the average production was more in Rangamati than in Bandarban area. It is more apparent for all three of the seasonal fruits that, the marketable surplus was found to be higher than the net marketed surplus. That means farmer retains more for their consumption and other uses than the actual amount marketed. Running factor analysis, several cases were found that affect sustainable market linkage which was categorized into four factors like marketing, economic, social and environmental factor and the KMO value was found to be 0.527, generally, indicate that a factor analysis might be useful with this data. This study recommends increasing the

marketed surplus with the increase of marketable surplus so that it can ultimately help fruit grower to link themselves with the market and increase their revenue.

Yadav et al. (2020) carried out study in the Azamgarh district of Eastern Uttar Pradesh to analyze marketed surplus and marketable surplus of cereals and oilseeds. The district Azamgarh was purposively selected for the study due to the convenience of the investigator. There are 22 development blocks in the district, one block namely, Pawai was selected randomly and from this block 100 respondents were chosen following the proportionate random sampling technique from 5 randomly selected villages. On the basis of holding size respondent were categorized as marginal (below-1ha), small (1-2ha.) and medium (2-4 ha.). Category wise 69 respondents from marginal, 22 from small and 9 farmers from medium holding size were included in study. The overall average size of farms came to 0.794 hectare. The average size of holding on marginal, small and medium farms, were found 0.272, 1.558 and 2.920 hectare, respectively. The cropping pattern revealed that highest area was covered under paddy and wheat followed by mustard. The cropping intensity was found highest on marginal farms followed by small and medium farms and it came to 269.86, 221.43 and 201.09 per cent, respectively. The cropping intensity decreased with increase in size of holdings of sample farms. On overall average per farm investment of sample farms was found Rs 330248.80. There were three marketing of channels i.e. Channel-I, Channel-II and Channel-III through which the farmers sold their produce. On an average per farm, total production, marketable surplus and marketed surplus of paddy were 2036.60, 1715.06 and 1715.06 quintal, total production marketable surplus and marketed surplus of wheat were 1812.01, 1253.00, and 1253.00, respectively whereas, total production, marketable surplus and marketed surplus of mustard were observed 261.60, 139.18, and 139.18.

2.3: Estimation of farm retention for consumption, seed, feed, wages and other payments in kind

Baruah and Barman (2002) had studied the marketed surplus of Sali paddy farmers. The main objective of the study was to identify the important

factors that influence the production and consumption of Sali paddy and to study their impact on the marketed surplus of the crop. The following equations and functional relationships have been formulated to determine the influential factors/variables such as annual on-farm and off-farm income of the family, average price per quintal of the crop, size of farms, farm family consumption of rice and family size and to study their impact on the marketed surplus of the crop. They have estimated the marketed surplus after splitting the above variables into five set equations keeping the marketed surplus as the dependent variable in all the equations. They have specified a Cobb-Douglas form of production function to estimate the parameters. The study has indicated that as compared to area the influence of yield on the marketed surplus of Sali paddy was more in small and medium farms. The influence was totally reversed in case of large farms. Hence, emphasis should be given to increase yield in large farms. The authors have concluded that the negative influence of family size on the marketed surplus of the crop should act as an eye opener particularly for the medium and large farmers.

Badi and Badi (2004) had referred the marketable surplus to the quantity of produce that could be made available to the non-farming population. According to them the marketable surplus was the residue left after meeting the requirements of the farmers. They were the requirements of the farmers for their family's consumption, cattle feed, farm needs i.e., seeds, payments to others in kind which include labourers, artisans like blacksmith, potter, mechanics, carpenters, payment to the landlord towards rent, social and religious payment in kind and losses enroute and wastage. They further described marketed surplus as that quantity of the agricultural produce which the farmer-producer actually sold in the market irrespective of his family requirement for the family consumption, farm needs or other requirements. The authors' have formulated hypotheses as marketed surplus is positively related to the volume of production and area under crop. They have further stated that the marketed surplus is negatively related to the size of family and level of consumption. The nature and extent of relation of marketed surplus with the identified four variables (Level of production, size of family, level of consumption and area under crop) was measured by employing the

regression analysis. The analyses were carried out individually for the identified independent variables keeping the dependent variable viz., marketed surplus in all the four regressions. It was stated and concluded that the estimated parameters were found to be significantly influencing the marketed surplus as per the a priori expectations.

Kumar et al. (2014) found that the percentage of the produce retained with the farmer reduced with the increase in the farm size. On overall, the percentage of total produce retained with farmer was 22.78% of total paddy production. The percentage of quantity for family consumption was also reduced with increase in farm size. The quantity of marketable surplus both in absolute and percentage term increased with increase in the farm size. However, the quantity of marketed surplus increased in the absolute terms but reduced in percentage term with the increase in farm size.

Kaur and Gupta (2017) carried out an empirical analysis of relationship between production and marketed surplus of gram crop in Bathinda, Punjab and reported that higher the level of production, lower is the consumption of crop used for retention purpose and higher is the marketed surplus. The improvement in the crop yield increases the level of production which in turn increase the extent of marketed surplus. For all size farm categories, major and significant proportion of gram crop of total retention was for use of feeding animals followed by use for seed requirements of next season. Whereas, out of total retention of gramleaflets, major share is used for home consumption requirements by sampled gram leaflets farmers. Further, it is noted that though the major portion of gram produce is sold in the market by sampled farmers, but the volume of retention of gram crop is quite high as compare to gramleaflets.

Sahu et al. (2017) analyzed the marketable and marketed surpluses of mustard in Morar block of Gwalior district (Madhya Pradesh) and found that the total household requirement under different categories was found to be 120 quintal for large farmers, 104.7 quintal for medium farmers and 18.35 quintal for small farmers. Further they stated that the study of marketed and marketable surplus in the economic system is more important than the study

of increase in agricultural production so as to find ways to increase the tempo of marketed and marketable surplus.

Balai et al. (2018) reported that the average production wheat per farm to be 42.78 quintals. Among the total production of wheat on an average 12.02 quintal (28.10% of total production) was utilized as family requirement to total production. For family requirement, the quantity of wheat retained by size group wise data shows that the small farmers retained wheat for consumption requirement is lowest i.e. 7.08 quintal per farm which is the highest proportion (34.93% of total production of small farmers) in comparison to other size group. It can be concluded that overall, on an average 28.10 per cent of the total wheat produce was utilized for various consumption purpose and remaining 71.90 per cent of the produce remained as marketable surplus. The data also showed that among the all size of farmers, the percentage of wheat consumption to total available wheat was found to decrease with increase in size of holding and marketable surplus of wheat increase with increase in size of holding.

Kumar et al. (2020) conducted the study in Udham Singh Nagar district of Uttarakhand based on data collected from 60 farmers (26 marginal & small, 18 medium and 16 large) for the agricultural year 2011-12. The costs and returns of wheat of different category of farms were calculated using CACP concept. Average size of land holding was 2.62 ha. In Rabi season wheat was grown as main crop. The per hectare total cost of production of wheat at aggregate level was Rs. 57392.26. Large farms incurred highest total cost (Rs. 59628.99/ha) and marginal & small the lowest (Rs. 55783.41/ha). The per quintal total cost of production was found highest on large farms (Rs.1330.70) and lowest on medium farms (Rs.1305). At aggregate level it was Rs.1336.57. Net return over cost C3 was highest on large farms (Rs. 16989.65) and it was lowest on marginal & small farms (Rs. 11205.35). At aggregate level it was Rs. 12754.60.

2.4: Examine factor influencing marketable and marketed surpluses

Khadase et al. (2001) determined the factors governing marketable surplus. Total marketed and marketable surplus had a positive relationship with the size of holdings, while retentions for in-kind payment and home consumption had a negative relationship with the size of holdings. Production was the major factor that increased the marketable surplus of jowar.

Rahji (2002) determined the level of agricultural commercialization in Oyo state, Nigeria. Author identified the factors influencing the marketable surplus out of total farm household production and examined the market outlets and the marketing behaviour of the households. Data were collected from a sample survey of 252 farm households in 1998. The level of agricultural commercialization was estimated to be 54.6%, implying that agricultural production in the state is market-oriented. Age of the household head, farm size, hired labour, distance to market, access to motor vehicle transport, and ownership of livestock were found to be significant factors influencing agricultural commercialization in the state. Three types of sales points for the farm households were identified: within own village; periodic rural markets; and nearby urban markets. He suggested some policy implications as per the result.

Virendra and Ramesh (2002) the marketable surplus was the theoretical surplus available for disposal with the producers, left after meeting his requirements of family consumption, payment of wages in kind, feed and seed. They had further tried to make a distinction between the marketable surplus and marketed surplus. They have said that the marketed surplus had represented the portion of marketable surplus which is actually marketed. The study was conducted with the objectives of finding out the level of marketed surplus by size of farms and to measure the nature and extent of relation of the marketed surplus with the identified variables. The independent variables were volume of production, size of family, level of consumption and the area under the crop. The authors had assumed the a priori for volume of production and area under the crop as positive and size of family and level of consumption as negative. The parameters of the above four variables were

estimated individually by analyzing the estimable form by adopting regression analysis. The results had revealed that the a priori was true.

Barman (2003) analysed the production and consumption variables influencing farm-level marketed surplus of winter rice. Study showed that marketed surplus of winter rice could be increased by increasing production in all categories of farms. The influence of yield on the marketed surplus was greater compared to the influence of area in both small and medium farms. The picture was reverse in the case of large farms. Farm size, rice-growing area and intensity of rice cultivation had a significant and positive influence on marketed surplus. Small farms were not found to be price responsive, signifying the prevalence of distress sales. Further, family size was found to be inversely related to the marketable surplus.

Price et al. (2003) described the Indian market for crops such as chickpeas, pigeon peas, black gram, mung beans, lentils, and dry peas in India, with emphasis on production and consumption patterns, marketing channels, and imports. The USA's competitive position as a supplier to the pulse sector was also examined. Data were based on information gathered during a tour of India in June-July 2001. India was the world's largest producer of pulses, which were an important component of the Indian diet. Stagnant production in that country had contributed to declining per capita consumption over the past 20 years. During this period, domestic pulse prices have increased relative to other foods. Despite a liberal import regime, imports had generally remained a small share of supplies. Most of the Indian consumers were highly sensitive to prices when making food purchase decisions. Higher relative prices caused consumers to switch to lower priced pulse varieties and grades, and to other food items, such as cereals and vegetables. The recent rose in the popularity of low-priced imported dry peas demonstrated that consumers substitute non- traditional varieties into their diet based on relative prices. US dry peas were not competitive in India because of the limited market for premium grades, as well as the higher costs associated with bagging and containerized shipping. US chickpeas had also been limited to a small, premium-based niche segment of the market.

Goyal and Berg (2004) analyzed the marketed surplus response of cereals in Haryana State. A model that considers the effect of both factor and output prices on marketed surplus was used for this purpose. To derive input demand and output supply elasticity's, the normalized quadratic profit function and demand equations were estimated jointly with the seemingly unrelated regressions (SUR) estimation technique using farm level panel data. The data confirmed the theoretical framework. The derived price elasticity's of input demand, output supply, and marketed surplus have been simulated to examine alternative price policies for securing different levels of marketed surplus. Study revealed that at the observed price structure marketed surplus of wheat will increase almost equal to population growth, but in case of paddy it will grow at a very low rate. The study further revealed that besides price adjustment, technological improvement and non-price factors are also of critical importance for increasing output supply and, hence, marketed surplus.

Singh (2005) examined the existing system of marketing of agricultural commodities in India; the extent of state intervention; and the factors impacting marketing efficiency. It also draws policy implications to improve marketing efficiency and reduce the need for a large-scale state intervention in different states. The crops covered in this study were: rice and wheat in Haryana, Punjab and Uttar Pradesh; rice and groundnut in Andhra Pradesh; rice and jute in Assam; and cotton, sugarcane and onions in Maharashtra. The study also examined the level of marketed surplus and the prices received by farmers by farm size; the share of public and private agencies in the marketed surplus; the price spread of individual commodities; and the spread of the marketing season. The study pertained to the agricultural year 2001-02 in all the states except in Punjab (2000-01). Among all the states, market intervention was very high in the marketing of rice and wheat in Haryana and Punjab and in rice in Andhra Pradesh. The procurement of wheat and rice had been also going on for quite some time in Uttar Pradesh. The prevailing system of marketing and the extent of state intervention varied considerably in the case of the three study crops in Maharashtra. The monopoly procurement scheme for cotton in Maharashtra had accumulated a huge amount of losses. The marketing of rice in Assam threw light on how the

system of marketing of rice in the state differed from that of other states and whether the farmers were able to receive minimum support prices.

Pouchepparadjou and Sendhil (2006) assessed the level of producer surplus of rice and the factors associated with marketed surplus in the Cauvery Delta Zone, the "rice bowl" of Tamil Nadu and the Pondicherry. The study covered the years 2002-04 and was based on data from a sample of 500 farm households distributed in 40 villages in proportion to the area under rice crop in each village. On an average, the marketable surplus and total retention were 9745.02 kg (73.86%) of total production and 3448.58 kg (26.14%), respectively. The average net marketed surplus and repurchases were 9060.21 kg and 453.06 kg, respectively. Farm size, rice output, wages in kind, and a dummy variable for education were found to have positively contributed to the marketed surplus.

Kumar (2007) observed that themarketed output was found to be having a direct relation with the size of land holding. Large farmers were found contributing around 45 per cent in total marketed surplus even though they constituted only 10 per cent of total cultivators. Output, farm size and area under tenancy were the significant factors with positive effect while family size and un-irrigated area had a negative effect influencing the aggregate marketed surplus. With respect to quadratic function, the coefficient of output was found to be significant and positive for aggregate output, wheat, paddy and coarse cereals and negative for pulses; the coefficient was insignificant in case of oilseeds and cotton. Marginal propensity to sale was found to be rising at all levels of output for wheat, paddy and coarse cereals but the same was found to be declining with a rise in output for pulses. Elasticity brought out an inverse relation with output for all crops except for pulses, oilseeds and cotton. The study brought out in light the better facilities of market and transportation, which the farmers could avail. There was equal participation by all size of farmers with respect to marketing efficiency at the farm size level. The price index calculated at the aggregate level showed that there was no price discrimination against the marginal farmers.

Verma *et al.* (2009) analyzed the dimension and magnitude of factors affecting the marketed surplus of wheat in Jaunpur district during 2004-2005. It was observed that a greater portion of market arrival came from larger size of holding. Besides, a remunerative price structure, easy and adequate financial availability and efficient means of storage and transport to check the price fluctuations were found necessary for sustained wheat production. The results indicated that lower holding size created hampered wheat production among the crops in particular. Size of net operated area, volume of production and number of adults units in the farm family was influenced by the volume of marketed surplus. An ever increase in population increases the demand of produce on one hand and on the other it's also reduces the size of holdings through consistent fragmentation.

Reddy (2009) reported that except for paddy, groundnut and jute, all other crops recorded negative growth due 12 to increase in real cost of production and relative decline in prices of output. The projected demand and supply figures indicated that there was a need to significantly increase the area under both pulses and oilseeds in the long-run to make it self-sufficient and to increase food and nutrition security. There were significant monetary benefits to farmers through crop diversification to pulses and oilseeds in addition to food security. The results also revealed that after 2002-03 there was an increase in marketed surplus for all crops except for oilseeds, which still had a large negative value indicating a need for large-scale diversification from paddy to non-paddy crops especially for oilseeds in terms of food and nutrition security. The calculation of elasticities and marginal effects from a one hectare shift in area from the existing cropping pattern to cereals, pulses and oilseeds indicated that there was not only gains in terms of food security at macro-level but there was a direct benefit to farmers in terms of increase in gross value in shifting to pulses and oilseeds. Enhanced supply of inputs like seeds, fertilizers, pesticides and irrigated area was needed to sustain the agricultural production and seed replacement ratio to be increased by development of innovative supply chains for certified seeds. Further, study stressed on enhanced infrastructure to sustain agricultural growth at desired

level and a wide network of bank branches and micro-finance to bridge the increase in credit demand.

Sengupta (2010) conducted a case study in three districts of South Assam with the objective to find out the degree of agricultural prosperity of the regions by examining response of marketed surplus due to changes in agricultural production. The study also examined the relation of marketed surplus with the size of holdings of farmers and to investigate the responsiveness of marketed surplus to price changes and the level of production. Various hypotheses were also formulated to see the impact of variables on marketed surplus. The study revealed that around 44 per cent of the surplus was generated in the valley out of total production and there was a direct relation between surplus and size of holding. It was also found that small and marginal farmers suffered from extreme poverty and agriculture was still carried out on a subsistence basis. Retention was an important determinant of marketed surplus and the share decreased in direct proportion to size of holding. Another feature that emerged from the study was that, the deviation of prices per quintal from average price decreased with the size of holding, indicating poor bargaining position of the farmers. Prices as an important determinant were found to be having both forward and backward linkages. Retention for consumption played a greater role and production did not explain the behavioural pattern of surplus among small and marginal farmers.

Baba *et al*. (2010) reported growth of vegetable sector in relation to Technology Mission, extent and determinants of marketed surplus andprice spread of vegetables in the Kashmir valley. A substantial increase in the areaand production of vegetables was observed under Mini-Mission-II scheme of Technology Mission. On an average, producers' marketed surplus was found more than 92 per cent of the total production of selected vegetables. The estimates of regression function revealed that production, area under improved varieties, net price received by producers and education level were significant and positive determinants of marketed surplus, while spoilage at farm level and consumption have showed a negative contribution.

Chauhan and Sushil (2010) concluded that about 63 per cent of the total maize cultivated area was under high yielding varieties (HYV) andremaining (37%) area was still under traditional local varieties. The total area under maize, both HYVs and local, showed positive relationship with size of holdings.The study also observed that irrigation played an important role in the enhancing maize production and productivity of both local and HYVs. The marketablesurplus of maize estimated at (48%) was mostly (72 to 83%) disposed off in second quarter (December-February) due to inadequate storage structure at the farmers level and fear of its spoilage due to attack of insect pests. Results show that production was most dominant and significant factor in determination of magnitude of marketed surplus.

Borate *et al.* (2011) estimated marketable and marketed surplus of red gram and identified factors influencing surplus in Vadodara district of Gujarat. The author used data collected by him from 120 redgram growers spread over 10 villages of Karjan taluka during 2007-08. A multiple regression technique was applied to gauge effect of various factors influencing marketable and marketed surplus. Results show that marketable surplus was positively and significantly related with cropped area and average productivity in all the four categories of farms. It was negatively related with family size and quantity retained for wages in kind indicating inverse relationship between extent of marketable surplus and these factors. An examination of individual coefficients revealed that marketed surplus was positively and significantly related with total production, current price and financial obligations while family size showed negative sign indicating inverse relationship of marketed surplus with family size on sampled farms.

Singh *et al*. (2011) estimated the extent and pattern of marketed surplus and home utilization of wheat on farm house-holds in Punjab. The analysis of monthly records in this respect of cross-section data collected under Comprehensive Scheme to Study the Cost of cultivation of PrincipalCrops revealed that 7.69, 3.17, 2.41, and 2.28 per cent of the total wheat output was utilized athome as food, animal feed, seed and kind payments, respectively. The output elasticity of marketed surplus which was

found out to be positive and more than unity indicated that in state the marketed surplus of wheat grew faster than the increase in production. In contrast to the official records indicating only 62 per cent of total wheat produced in state as market arrivals, the study indicated that marketed surplus constituted about 82 per cent of the wheat produced on sample farm households, thus clearly indicating that a significant proportion of marketed surplus was disposed of without entering the state records, resulting in loss to the state exchequer through evasion of market fee, rural development fund and other taxes.

Sudhakar and Jha (2011) conducted micro level study of marketed and marketable surplus of rice in Bihar. They concluded that both, marketed and marketable surplus increased with increase in the size of land holdings and with quantum of rice production. The ratio of marketable and marketed surplus to production of rice also increased with increase in the size of holdings. Rice is main staple food crop which is grown for home consumption. Hence, marketed surplus found lower than marketable surplus in all the categories of households because farmers prefer to keep part of rice production for consumption purpose and like to keep more quantity as there is no guarantee of good harvest in the next season.

Birachi *et al.* (2011) conducted a study in Burundi to assess the determinants of quantity produced and marketed by smallholder farmers. A total of 380 farmers obtained through a multistage sampling technique, constituted the study sample. Constraints to production and supply of beans to markets include lack of productive assets, lack of improved varieties and inadequate use of fertilizers. Results with regard to these constraints indicate that a unit increase in the value of productive assets is likely to lead to about 10 percent increase in production of beans; while changing to improved bean varieties may increase production by (22%). In addition, a kilogram increase in fertilizer use is likely to raise bean quantities produced by about (10%). Constraints that affect quantities of beans marketed by farmers include levels of production and losses due to transport problems. Thus, an increase in quantity produced will lead to an almost (30%) increase in marketed

quantities, while reduction in transport losses will lead to an increase in marketed quantities by about 12%. However, an increase in quantity of beans stored for food will lead a reduction in marketed beans by about (19%), implying that storage of beans may not be targeted at the market but for food security purposes. Efforts that promote collective action among farmers while encouraging increasing the proportion of land under beans are likely to enhance bean production and consequently marketable surplus.

Singh et al. (2011) worked out the marketable and marketed surplus of main vegetables in eastern Uttar Pradesh for the agricultural year 1999-2000. The study on major vegetables growers of Ghazipur district showed that marginal and small farmers sell more quantities of chilli, potato and onion etc. than medium and large farmers. The extent of marketed surplus to marketable surplus was higher on marginal and small farms as compared to medium and large farms.

Grover (2012) focused the large – scale state intervention in marketing of food grains in the region of Punjab. With the help of study it was found that escalating MSP and effective price policy for paddy and wheat has resulted into paddy-wheat monoculture in the area. Government purchase had lost its relevance to the demand and supply situation. According to the study, emphasis of farmers was on producing more irrespective of the quality. An assured government purchase of food grains during the last four decades was blamed to be a culprit for deterioration of farmers' quality consciousness. Inadequate scientific storage of foodgrains by state was the major hurdle and called for the development of public-private partnership. As per study, there was a need for incentives to be provided for the storage of food grains at farmers' level and to private traders to reduce the dependence on state owned storage. The study brought in light the opinions of small/marginal farmers, who expressed that private traders not only offered lower prices for the produce but also delayed the payments.

Manan *et al.* (2013) studied on determinants of marketed surplus - a case of seed cotton growers in district Khanewal. Study reported that impact of major factors affecting marketed surplus of seed cotton in district

Khanewal. For this purpose primary source of data was used. A representative sample of 40 cotton farmers was selected using stratified random sampling technique. In this study double log form of regression analysis was employed. The results revealed that value of adjusted R2 was 0.64 whereas F-value was10.81. The variables of farming experience (0.511), education (0.743), area under cotton cultivation (0.318) and distance of farm from wholesale market (0.306) significantly affected marketed surplus of seed cotton where as marketing cost (0.012) and sale price of seed cotton (0.092) were insignificant variables.

Usha (2013) conducted study on marketable and marketed surplus of major food-grains in Haryana. The study found that the estimation of per farm marketed surplus of paddy was found in Karnal district was 67.41qt, large farmers was around 219qt and 22qt by marginal farmers, The marketable surplus of wheat on sampled farmers in Karnal and Bhiwani was 17974qt and 1477qt respectively. Determinants of marketed surplus of selected food grain crops in Haryana show that regression coefficient of production in case of paddy was positive, greater than 1 and statistically significant at the overall level and showed highinfluence on marketed surplus of paddy. The model explained 99 per cent variation in the marketed surplus of paddy at the overall level. The findings of regression model carried out for wheat in Karnal and Bhiwani indicated thatindependent variables included in the analyses explained 98 and 99 per cent variation in the marketed surplus of wheat in the selected districts.

Bizualem *et al.* (2015) conducted study on analysis of marketed surplus of coffee by smallholder farmers in Jimma zone, Ethiopia. Study revealed that the average amount of coffee marketed in Limmu-Kossa district was 15.5qt and in Gomma it was 7.2qt. The Chi-square test result showed that there was significant difference in districts between marketed surpluses at 1 per cent significant level. 12 explanatory variables (five continuous and seven dummy) were hypothesized to be determinant factors to affect marketed surplus of coffee. Multiple Linear Regression (MLR) model and the result revealed that seven explanatory variables were found to statistically and

significantly affect the quantity of marketed surplus of coffee. The F-test calculated value F (12, 139) = 40.94was highly significant; and the adjusted R2 was computed to be 76 per cent implying that 76 per cent of the variation in thedependent variable was explained by the explanatory variables.

Prusty and Tripathy (2015) studied the factors affecting marketed surplus, price spread, marketing efficiencies and constraints of milk marketing in organized and unorganized sector in Cuttack district of Odisha. Authors found that milk production and price of milk had positive and significant impact on marketed surplus but family size had negative impact and significant in both market structures. The major problem of marketable and marketed surplus they found in the study area was low price and irregular payments. Their study suggested that for getting marketing benefit, remunerative price with regular payment to the farmers is needed.

Subhash (2016) conducted study on nature, extent and determinants of marketed and marketable surplus of traditional vis-à-vis improved variety of paddy in eastern Uttar Pradesh The main findings revealed that the per farm marketable and marketed surplus of traditional paddy was observed 59.46 and 57.19 per cent, respectively whereas per hectare was observed 47.60 and 45.75 per cent respectively. The per farm, marketable and marketed surplus of improved paddy was observed 57.41 and 54.58 per cent respectively whereas; per hectare was observed 50.52 and 48.00 per cent respectively. Marketable surplus and marketed surplus was lower due to higher quantity used as payment in kind, seed and family consumption. The regression coefficients were positive and statistically significant on different size of farms in both crops indicating that the factors considered explain 84 to 99 per cent of variation in dependent variable.

Deogharia (2017) studied the marketable and the marketed surplus of selected vegetables and its distribution in different marketing channels in three districts of Jharkhand. Using multistage random sampling method 150 vegetable cultivators were selected from Ranchi, Lohardaga and West Singhbhum districts of Jharkhand for the study. The study found that price has

no impact on marketed surplus. There is a need to restructure primary co-operative marketing societies.

Pawariya et al. (2020) undertaken a study in the production area majorly Nagaur and in some part of Jodhpur district of Rajasthan to access the problems and constraints faced by farmers in the production and marketing of Nagauri (Paan) methi. A total sample of 150 farmers from 30 villages of two districts were selected for the study. The primary data were collected from the farmers by using pre tested structured schedule. The results from investigation shows that most important problem ranked first (Garret's mean score is 75.60) was faced by farmers are lack of remunerative price of the product, which is 90 % of farmers were facing followed by lack of proper market center (Rank II), monopoly of traders (presence of less competitive firms), higher price spread. Least marketing constraint was payment delay which was faced by 55 per cent farmers ranked XIII. The major production constraints were drying of leaves (Garret's mean score is 73.41) ranked I followed by irrigation and less use of technology. The appropriate policy suggestions are market establishment, government intervention to provide the remunerative price of Nagauri (Paan) methi and technology use.

M'ithibutu et al. (2021) reported that the commercialization of tomatoes and kale was real in different areas of study which was influenced by structural and socio-demographic factors. From the study findings, structural policies to promote horticulture and high value crop production had a positive impact on production of vegetables while wildlife conservation and livestock development resulted to human-wildlife conflicts due to agrochemical abuse. Various socio-demographic factors that influence commercialization of vegetables included: household size, farm size, proportion of land used for vegetable production and household income. It emerged that household size (Eigen value EV=3.63), income (EV=2.61) and farm size (EV=1.27) accounted for 68.4% of variability in agrochemical abuse. This finding also explains their marginalization from county government extension services and high costs of market access.

2.5: Examine the problem faced by farmers in marketing and their suggestions

Khadase and Pawar (2000) revealed the marketable surplus of gram in different farm size groups in Vidarbha region, Maharashtra, India was examined based on data from a purposive sample of 9 farms. Marketable surplus showed a positive relationship with size of holdings. The quantity sold by small size group farmers was less than the marketable surplus.

Atteri and Bisaria (2003) reported that marketable surplus for small, semi-medium, medium and large farms was 51.81%, 59.75%, 68.52% and 88.69% for rice and 8.74%, 60.24%, 71.53% and 85.00% for wheat, respectively. The total estimated marketable surplus for all India was 39.46% and 43.79% for rice and wheat, respectively. Furthermore, the paper shows that net benefits of Rs.9.06-9.92 per quintal per month for rice and Rs5.08-5.93 per quintal per month for wheat can be obtained from godowns storage, at average prices and costs.

Lal *et al.* (2003) conducted a studies and observed that farm level retention of wheat was 2798 quintals with an average marketable surplus of 36 57 quintals which constituted 56 65 per cent of total supply w*' the farmer Major portion 72 31 per cent of marketed surplus was sold in village itself, out of which 43.52 per cent was sold just after harvest Marketable as well marketed surplus of wheat /anes with the farm size

Anonymous (2007) revealed that storage of soybean is one of the major problems. The soybean contents about 20-22 per cent oil and highly susceptible to shattering losses, spoilage grain in pods due to occasional rains received during the harvesting period and losses due to impact damage require more careful handling during harvesting and threshing operations to avoid stress, cracks, splits and breakage of kernels. Broken soybean grains loose their values as seed and create storage problems because of accelerated attack on the exposed oily and porteinous materials. Therefore, storage of soybean for seed purpose should be done in bins. It was

suggested that timely harvesting and proper handling are important for enhancing quality and quantity of soybean production. Delayed harvesting leading to pod shattering is one of the major cause of reduced yield in soybean. Moisture content of the seed is the criterion for seed harvest. In most of the varieties change of pod color to golden yellow indicates the stage of harvest. The harvested plants should be left on the threshing floor for 2-3 days for drying. The dried produce should be threshed by operating mechanical threshers at a low cylinder speed.

McCarthy (2008) reported that taking advantage of wheat production trends will require farmers to increase production, reduce post-harvest losses with the adoption of post harvest management practices and to marketing their crops in new ways. Amendments to the restrictive state marketing channel (through mandies or wholesale markets) are beginning to allow farmers to access more profitable channels for their produce. The mandi system doesnot reward farmers for higher-quality produce as alternative market channels would, such as direct supply to supermarkets. Farmers will need to learn proper techniques for ensuring the quality of their produce to satisfy the requirements of supermarkets.

Patel (2009) reported that majority of the soybean growers (90%) reported that shortage of power supply is the main constraints followed by Lack of skill labour at the time of harvesting and winnowing period and Lack of storage facilities got (rank IInd) in important constraints respectively. The next important constraints was unfavorable weather condition at the time of harvesting (rank IIIrd) followed by Shortage of labour at time of harvesting and Lack of all weather roads (rank IVth), Detonation in quality of grains when combiner is used (rank Vth), Lack of technical knowledge and Lack of capital (rank VIth), Unavailability of machine at the time of harvesting and Unavailability of machine at the time of threshing and winnowing (rank VIIth), Lack of knowledge about warehouse and Lack of suitable site/floor for drying (rank VIIIth) respectively.

Meena and Tiwari (2010) investigated marketed surplus, consumption and disposal pattern of milk in Banswara district of Rajasthan. The study

covered 90 milk producers selected randomly from six villages which were post-stratified into small, medium and large herd size category. The study revealed that production, marketable surplus and marketed surplus of milk per household were 7.16 lit., 5.56 lit. and 2.81 lit., respectively. Marketed surplus of milk (39.01%) was lower than marketable surplus of milk (77.65%). Out of total milk retained at home (4.35 lit.), about 1.78 and 2.57 lit. milk were consumed as liquid and converted into milk products, respectively.

Chauhan and Kumar (2010) Concluded that nearly one half of the marketed surplus was mostly disposed off in second quarter (December – February) due to inadequate storage facilities at farmers level and occurrence of the post harvest losses by insect pests attack 20 during storage. The total post harvest losses of maize estimated at the producer level were to the extent of 3.13 percent.

Mechan (2011) reported that lack of knowledge about recommended post harvest technology and lack of knowledge about recommended practices are reported by 42 and 27 per cent of total farmers respectively. This huge portion of farmers that strengthening and streamlining the existing extension services help in achieving higher productivity also suggests it. There is an extension gap contributing to the existing yield and technological adoption gap.

Mayda (2011) reported that 28.25 per cent of the total chickpea produce was utilized for various consumption purpose and remaining 71.75 per cent of the produce remained as marketable surplus (i.e. 7.29 quintal/farm), out of which 7.04 quintal/farm was actually marketed. The data also shows that among the all size of farmers, the medium farmers retained maximum quantity of chickpea for family consumption and minimum quantity they retained for marketable \purpose. The overall result of production function analysis clearly indicate that independent variable considered under study contribute significantly in increasing marketable surplus of chickpea.

Maske *et al*. (2012) found on an average, producers' marketable surplus to be more than 99.76 per cent of the total production of selected

papaya grower's area. The price spread of papaya with respect to various marketing channels has indicated that the producers' share has an inverse relationship with the number of intermediaries. The net price received by producers is relatively higher in the channels in which the produce is directly sold to the consumers or retailers.

Onyenobi *et al* (2014) studied the result and showed that the farmer realized N318150 ha-1 from 3030 kg h-1 of yam tubers in marketable surplus. It was implied from the results that increase in the farmer's age, transportation cost and household size will significantly lead to decrease in the yam marketable surplus in the study area. Increase in non-traded yam will lead to increase in yam marketable surplus if the quantity of yam produced per hectare increases. Increase in farming experience, marketing experience, and cost of seed yam will significantly lead to increase in the yam marketablesurplus of the farmer. These results call for promulgation of policies to improve farm production efficiency in the study area.

Pallewar *et al.* (2014) used the simple mean and average method to work out the marketable surplus and disposal pattern of wheat crop. Per farm quantity produced of wheat was estimated at 15.33 quintals at marginal farms, 21.37 quintals at small farms, 26.84 quintals at medium farms and 122.85 quintals at large farms in study area. The average quantity sold through village traders and wholesaler was observed as 20.79 per cent and 79.21 per cent in study area, respectively. The average price received by producers from these intermediaries was observed as Rs.997.50, Rs.1023.75, Rs.1050 and Rs.1110 per quintal at marginal, small, medium and large farms, respectively in Durg district.

Sharma and Rathi (2014) reported 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).

Ghule et al. (2014) analysed that the demand for milk and milk product is increasing rapidly. Authors estimated marketed surplus of milk and analyse its disposal pattern on commercial dairy farms of Maharashtra. Authors collected primary data from a sample of 40 commercial dairy farms drawn from two clusters of six villages Ahmednagar district. The commercial farms were classified into small, medium and large categories based on herd size. The study revealed that the marketed surplus as percentage of milk production was 94.48, 94.81 and 96.96 per cent for small, medium and large commercial farms, respectively. The contribution o f small, medium and large category of farms to the total marketed surplus was 38.69, 20.68 and 40.63 per cent, respectively. Out of total quantity of milk marketed per day by the sample farms, 33.16 per cent of marketed surplus was disposed to cooperative dairy, 55.65 per cent to private dairy and the rest 11.19 per cent was sold to the vendor.

Kashish et al. (2014) examined marketed surplus, disposal pattern of milk and constraints faced by smallholder dairy farmers in Punjab. It was found that milk production, consumption and marketed surplus has direct relationship with farm size. The average production of milk was 27.55, 37.05, 40.95 and 45.2 litres/day for LL, MR, SM and OT dairy farm and per capita availability of milk was 690, 843, 869 and 935 gm/day which was quiet above the national average of 290 gm/day and minimum recommendation of ICMR of 250 gm/day. On an overall basis 11.26, 6.40, 7.40 and 18.12 litres of milk/day was sold by sample households through dairy cooperatives, private milk processors, milk vendors, consumers and halwaiis.

Kumari and Jadav (2016) analysed the marketable surplus and disposal pattern(agency-wise, place-wise) of potato in middle Gujarat. A multi-stage sampling technique was carried out to select the villages and respondent. The marketable and marketed surplus was 92 and 90 per cent of total production. Wholesaler cumcommission agent having major share (60%) in agency-wise sale and distant market having major share (68%) in place-wise sale of total marketed surplus. The marketed surplus as well as share in

sale through local markets and from field was higher for small and marginal farmer category due to immediate cash requirements.

Patel and Pundir (2016) studied in middle Gujarat with a view to investigate the disposal pattern, marketing cost, marketing efficiency and price spread in pomegranate . A sample of 90 pomegranate grower as well as 15 wholesalers and 15 retailers was randomly selected from Vadodara, Chota Udepur and Kheda markets for in-depth investigation. The result shows that, on an average marketable surplus was 98.32 per cent of total production of pomegranate.

Sahu et al. (2017) analyzed the marketable and marketed surpluses of mustard in Morar block of Gwalior district (Madhya Pradesh) and found that the total production generated by large, medium and small farmers was 1195.9 quintals, 936.1 quintals and 205.1 quintals respectively. The total household requirement under different categories was found to be 120 quintal for large farmers, 104.7 quintal for medium farmers and 18.35 quintal for small farmers. Thus the marketable surplus generated was 1075.9 quintals by large farmers, 831.38 quintals by medium farmers and 186.75 quintals by small farmers. Thus the marketed surplus generated was 1026(86.72%) quintals by large farmers, 852.63 quintals (92.11%) by medium farmers and 198 quintals (97.53%) by small farmers. Thus, the study of marketed and marketable surplus in the economic system is more important than the study of increase in agricultural production so as to find ways to increase the tempo of marketed and marketable surplus.

Jeyaramya (2020) reported that there is no significant relationship between the age of the respondents and their overall marketing problems faced by agricultural farmers. Further, the various aspects through which the farmer'schoices of marketing agricultural productsandoverallmarketingproblemsfaced by agricultural farmers properly. Agricultural marketing in Indiahas beenfacing manyissuesand challenges, for that government support is required for the development of marketing of agricultural produce, through which suitable budget allocations to rural infrastructure plans, and proper supervision for effective plan implementation.

Sundaramoorthy and Abirami (2021) studied the problems faced by the farmers why they are shifting area from agriculture to non-agriculture. Both primary and secondary data were used. 350 samples were collected based on a convenient sampling technique. Data were analyzed with the help of SPSS. The significant finding of the study is that Lack of long term policy perspective, Monsoon failure, There is no planning in agricultural land and Importance for traditional cultivation. These four factors mainly induce the farmer shifting area from agriculture to non-agriculture.

Chapter - III
RESEARCH METHODOLOGY

The study is undertaken to work out the CGR, marketable surplus, marketed surplus, farm retention for consumption seed, feed, wages and other payments in kind and factors of the selected crops. This study also dealt with problem faced by the farmers during production and marketing of the selected crops. This chapter deals with the nature and type of data required, sampling techniques used for collecting the data and analytical tools applied in processing of the data for their economic interpretation. It also includes the general description of the study area, concepts and terms used in the study etc. this research study is split into following four sections:

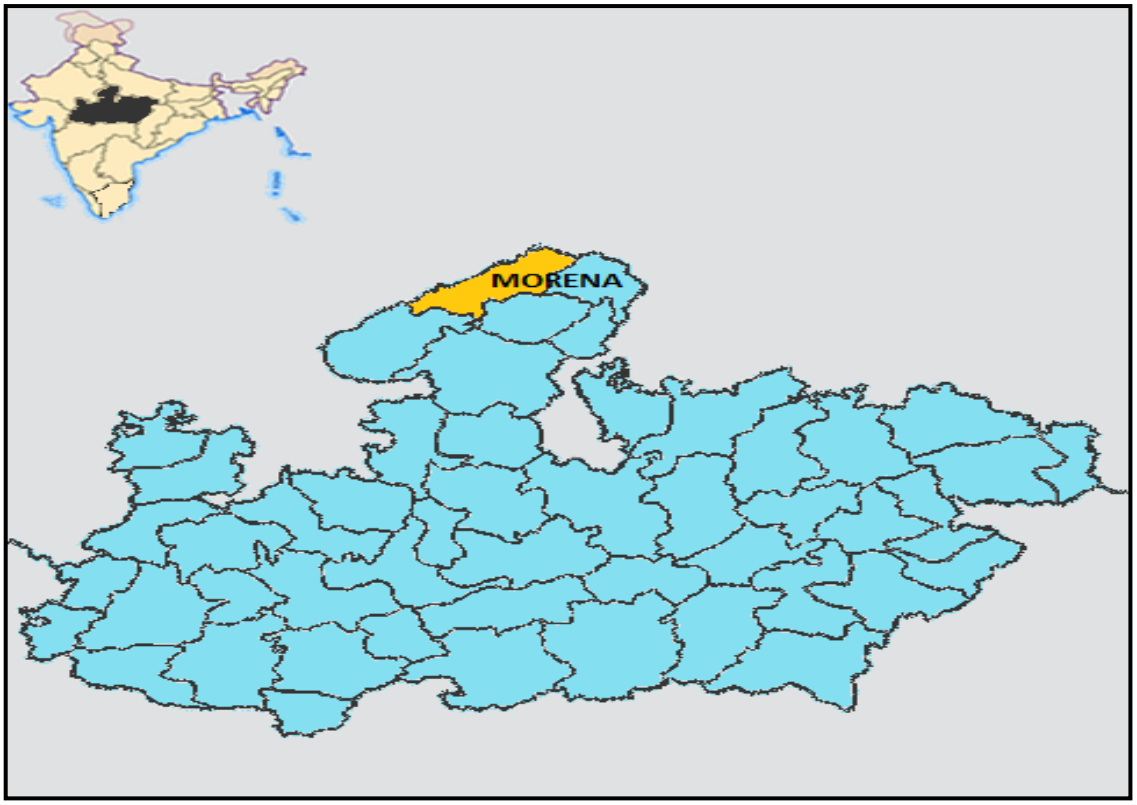
3.1 The study area
3.2 Sampling procedure
3.3 Nature and collection of data
3.4 Analytical tools

3.1. The Study Area:

The present study is confined to Morena district only. This area is purposively selected by the researcher because of his residence and also the ease of collecting appropriate and reliable data within the time and financial constraints. The major crops of Morena district are Mustard, Wheat, Pigeonpea and Bajra which was selected purposively for in-depth study.

District Morena

Morena is the district of Indian state of Madhya Pradesh. The administrative headquarters of the district is located in Morena under the Chambal division. Morena is known as an industrial hub but the economy relies majorly on agriculture. Morena district is extended in the north 250 17’ to 260 52’ latitudes and 760 30’ to 780 33’ East longitudes. The river Chambal flows forming all northern boundaries of the district and divides Rajasthan and Uttar Pradesh from the district. In the south-east of the district is Gwalior, Shivpuri in south, Bhind in east, Agra (U.P) in north-east, Dhaulpur and Karauli (Rajasthan) in north-west and Sheopur in southwest.



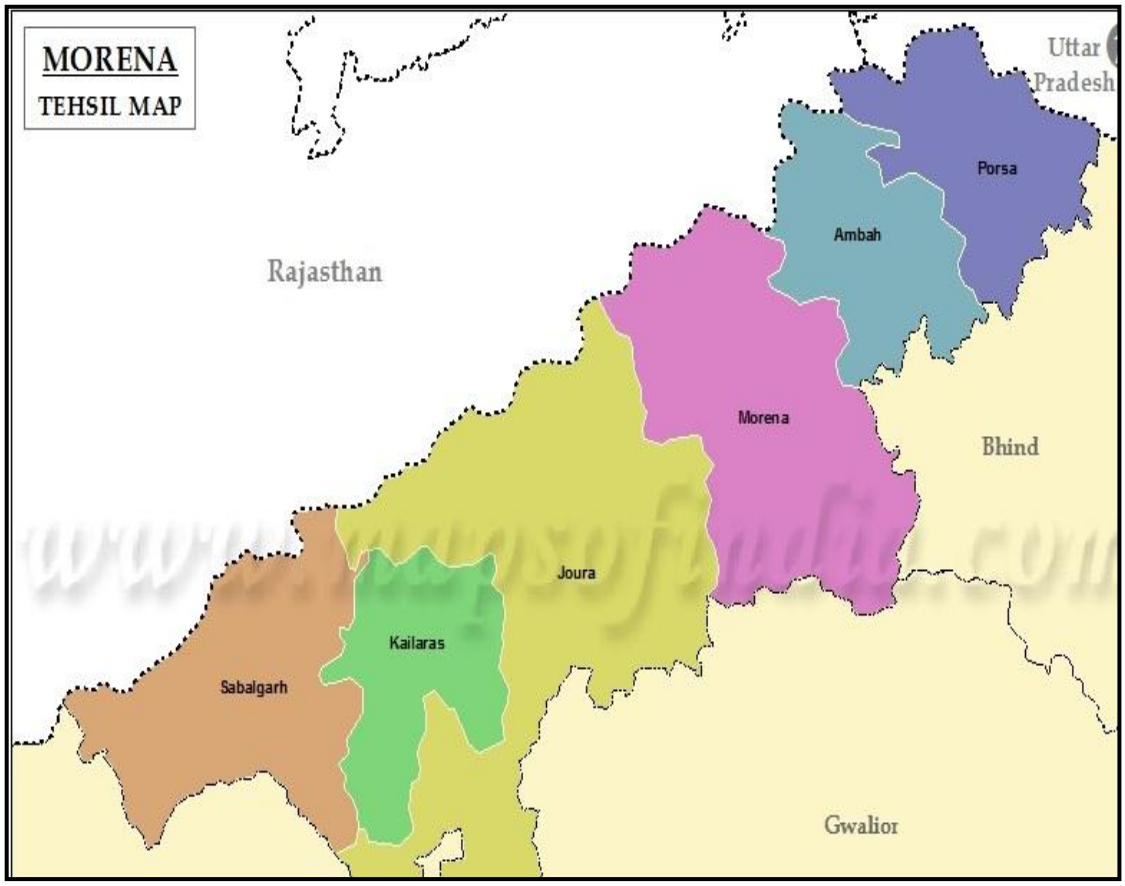


Fig. 3.1: Locale of the study

The district is situated at 150 to 300 meters from the mean sea level. Morena district has an area of 4,998 KM^2. The total population of the district based on the 2011 census is 19,65,970. The average temperature in Morena is 25.8 °C. The rainfall here is around 879 mm. Average annual rainfall of the district is 753.7 mm usually; first monsoon showers come between ends of June to September. The Morena district comes under VI Gird Agro Climatic Region. The district is mainly having alluvial soils.

3.2. Sampling procedure

For the selection of the sample, multistage sampling technique namely, selection of blocks, villages and farmers was followed.

Selection of Blocks

Morena district comprises of 7 blocks i.e. Morena, Porsa, Jaura, Ambah, Kailaras, Sabalgarh and Pahargarh. In the first stage of sampling Morena, Porsa, Jaura and Ambah block was selected because of highest production of Mustard in Morena block, Wheat in Porsa block, Pigeonpea in Jaura block and Bajra in Ambah block.

Table 3.1: Block-wise production of selected crops in Morena district 2017-18

Study crops	Selected blocks	Production (TMT)	Percent (%)
Mustard	Morena	336	31.49
Wheat	Porsa	350	32.80
Pigeonpea	Jaura	20	01.87
Bajra	Ambah	361	33.84
Total		**1067**	100.00

Selection of villages

At the second stage, block-wise list of villages was prepared. Five villages from each block were selected randomly that forms a sample of 20 villages.

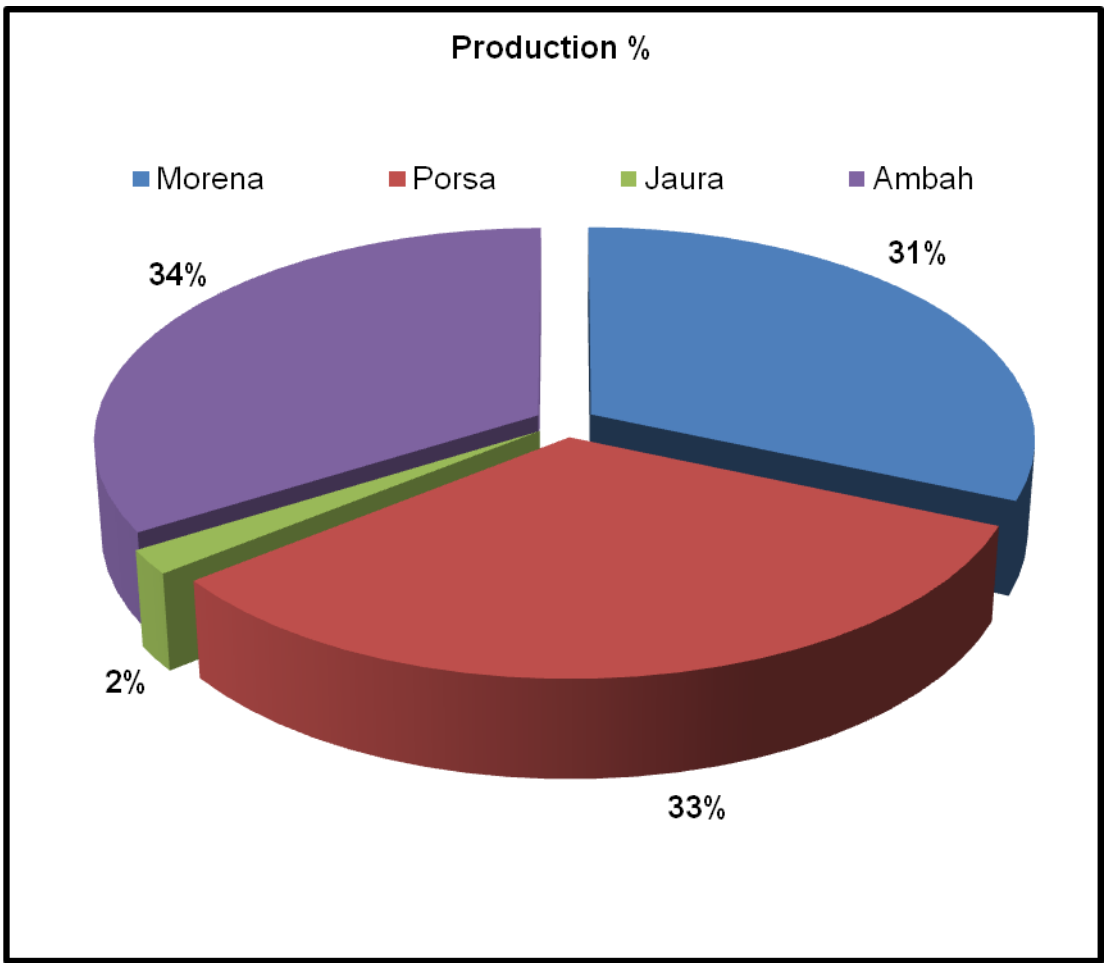


Fig. 3.2: Block wise production of selected crops in Morena district

Selection of farmers

At the third stage, village-wise list of selected crop growers was prepared from each selected villages. A total of 320 farmers; 80 from each crops viz: Mustard, Wheat, Pigeon pea and Bajra growers were selected from

the prepared lists through proportionate random sampling technique by using the formula given below.

$$n_h = \frac{N_h}{N} \times n$$

Where,

n_h = sample size for stratum h

N_h = population size for stratum h
N = total population size

n = total sample size

Table 3.2: Details of the selected sample by crops grown

Selected Crops	Selected Blocks	Selected Villages	Number of selected farmers
Mustard	Morena	Sirmiti Ghurghan Jatwar ka pura Bhatari Karari	22 21 21 12 4
Sub- Total	**1**	**5**	**80**
Wheat	Porsa	Dhaneta Nand ka pura Dharangarh Barvai Kasmana	15 9 20 16 20
Sub- Total	**1**	**5**	**80**
Pigeonpea	Jaura	Chena Roonipur Mundravaja Hathiriya Mugavali	12 20 20 10 18
Sub- Total	**1**	**5**	**80**
Bajra	Ambah	Khadiyahar Ratiram pura Dimni Thara Navli	22 10 15 18 15
Sub- Total	**1**	**5**	**80**
Grand Total	**4**	**20**	**320**

3.3. Nature and collection of data

For the present study, both primary and secondary data were collected from the respondents who were selected through several sampling methods and other reliable sources.

3.3.1. Collection of data:

Depending upon the objectives of the study secondary data as well as primary data was used. The secondary data were collected through different published sources as well as Department of Agriculture Statistics of Madhya Pradesh. The primary data were collected from selected major crops growers (respondents) using pre-tested questionnaire, through survey method. Each selected respondents were approached personally for recording relevant data.

3.3.2. Period of study:

In order to get comprehensive picture of compound growth in area, production and productivity of Major crops in Morena district, time series secondary data for the period of 18 years (from 2000-2001 to 2017-18) were collected. The primary data were collected for the Agricultural year 2017-18.

3.4. Analytical tools

3.4.1. Compound growth rates

Compound growth rates of area, production and productivity of major crops were worked out for Morena district of Madhya Pradesh during the period 2000-2001 to 2017-18. Compound growth rate were worked out by fitting exponential function as given below:

$$Y_t = ab^t$$

Where,

Y_t = dependent variable on area, production and productivity in the year 't'

a = constant,

b = regression coefficient,

t = time element which takes the value 1, 2, 3,....n

After transforming the model into a linear form by taking logarithms, we get

$$\text{Log } Y_t = \log a + t \log b$$

By putting Log Y_t = y, log a=A and log b=B, the model becomes linear between y and t, as y = A + Bt, fit the model by the method of ordinary least squares (OLS) technique.

The compound growth rate (r) in per cent was obtained by the following formula:

$$r = (b-1) \times 100 = (\text{antilog } b-1) \times 100$$

The significance of growth rate was tested by applying student't' test statistic

$$T = r/S.E.\ (r)$$

Where,

$$SE\ (r) = sqrt\ [\Sigma(y_i - \hat{y}_i)^2 / (n - 2)\ ] / sqrt\ [\ \Sigma(x_i - x)^2\ ]$$

Which follows't' distribution with (n-2) degree of freedom, n is number of year considered under study. The compound growth rates were computed for area, production and productivity of major crops in Morena district of Madhya Pradesh.

4.2. Concept of Marketable and Marketed Surpluses

(a) Marketable Surplus

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 farmers' family for consumption (retention + purchase), payment of wages in kind, feed, seed, wages and purchases have been met. The marketable surplus is computed by the following algebraic formula,

$$MS = P - C$$

Where,

MS = Marketable surplus,

P = Gross production in the year,

C = Total requirements in the same year for family use such as consumption (retention + purchase), payment of wages in kind, feed, seed, barter, payment of loan/ irrigation and physical losses/ wastage in storage/ transportation/ threshing etc.

(b) 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 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

B includes all the items mentioned

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

- Size of operational holding,
- Yield of Commodity,
- Price of the Commodity,
- Household Size,
- Requirements of seeds and feed,
- Payments to labor in kind,

- Distance from Mandi,
- 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. major crops, other crops or non-crops. In the case of major crops and other 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-crops viz. Mustard, Wheat, Pigeonpea, Bajra 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 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.

3.4.3. Factors Influencing Marketable Surplus and Marketed Surplus

The Marketable Surplus differs from region to region, within the same region, and even from crop to crop. Some of the factors affecting marketable surplus on a particular farm are:

i. **Size of holding:** There is a positive relationship between the size of the holding and marketable surplus.
ii. **Production:** The higher the production, the larger will be the marketable surplus.

iii. **Price of the Commodity:** There exists both positive and negative relation between both, depending upon whether one considers short run or long run.

iv. **Size of Family:** There is a negative relationship between family size and marketable surplus.

v. **Requirement of Seed and Feed:** The higher the requirement for seed and feed, the smaller the marketable surplus.

vi. **Nature of the Commodity:** The marketable surplus of non-food crops is generally higher than that of for food crops, as in case of former family consumption is either very small part of the total output or is negligible. Among various food crops, consumption of sugarcane, spices and oilseeds etc., require some kind of processing before final consumption; so marketable surplus as a proportion of total output is larger for such crops than for other food crops.

vii. **Consumption Habits:** Marketable surplus is inversely related to the consumption habits of people.

Marketed Surplus also differs from region to region and from crop to crop, depending upon the place of sale and the agents to whom the surplus is being sold. Price is the main factor that affects marketed surplus and there exists a direct relationship between price and marketed surplus. If higher prices are given for a particular crop, farmers sell most of their produce in order to earn profit. In addition to price, a number of other factors are there to influence marketed surplus, i.e., farm size, production, income, wealth, family size, risk and uncertainty, debts and obligations, desire for leisure etc.

Both concepts are important in determining the status of farmers in terms of their farm production, quantity sold, and their income which further determines their standard of living.

3.4.4. Determinants of Marketed Surplus

A theoretical model of marketed surplus response function has been used. The marketed surplus of a crop depends on various price and non-price factors. Empirical studies of marketed surplus have found that farmers respond positively to price changes, and this is consistent with economic

theory. In addition to price, a number of other socio-economic, institutional, technological and infrastructural factors influence marketed surplus.Among these are, farm size, the quantity of production, family size, wealth/income,risks, access to markets, market information, etc.A number of studies have reported that there exists a strong linear, and in some cases a non-linear relationship between the quantity sold and variables like farm size, quantity produced, family size, output prices and socio-economic andinstitutional variables for different categories of farmers.

The linear relation may bewritten as:

$$MS = \alpha + \beta i\ Xi$$

Where, MS denotes the marketed surplus, and Xi (i = 1, 2… n) represents theindependent variables influencing marketed surplus.

The dependent variable,marketed surplus (MS), is defined as sales as a share of total output per household.The independent variables include farm size (ha), family size (numbers), awarenessabout minimum support price (MSP), access to regulated market, distance to market(km), per household production of the crop (in quintals), sources of off-farm income,access to institutional credit, roads, markets and market information and pricereceived for the produce.

Chapter- IV

RESULTS

This chapter deals with the processing and analysis of the collected data during the study. The data were processed, tabulated and statistically analyzed to fulfill the objectives of the study.

4.1 Basic information of the respondents

4.2 Compound growth rate of area, production and productivity of selected crops in Morena district.

4.3 Estimate the marketable and marketed surplus of selected crops in Morena.

4.4 Estimate farm retention for consumption seed, feed, wages and other payments in kind.

4.5 Examine factor influencing marketable and marketed surpluses.

4.6 Examine the problem faced by farmers in marketing and their suggestion.

4.1: Basic information of the respondents

The investigation data was collected from 4 blocks (Morena, Porsa, Jaura and Ambah) of Morena district of Madhya Pradesh. Total number of farmers selected for the study was 320 following proportionate random sampling procedure to select representative sample households. The households were classified into four groups based on the size of land holding. The general information of the respondents is presented in Table 4.1.

4.1.1 Age distribution

The data in Table 4.1 shows that the age of the farmers of Morena, Porsa, Jaura and Ambah was found 53.15 years, 51.45 years, 43.41 years and 50.5 years, respectively. The average age of sample farmers was reported to be 49.62 years (Fig. 4.1).

4.1.2 Education status

The literacy percentage of the farmers of Morena, Porsa, Jaura and Ambah was found 27.28%, 15.56%, 27.92% and 29.24%, respectively (Table 4.1). The average literacy among the studied farmers was 25%. The highest educated farmers were found in Abmah block with literacy of 29.24 per cent (Fig 4.1).

4.1.3 Social grouping

The data in Table 4.1 shows that majority of the farmers belong to general category followed by other backward category. The number of SC/ST farmers was found negligible i.e. below 0.5%. The social grouping showed that on an average 85%, 11% and 4% farmers belong to general, OBC and other category, respectively (table 4.1).

Table 4.1: General information of the respondents

Characteristics	Morena	Porsa	Jaura	Ambah	Mean
Average Age (in yrs)	53.13	51.45	43.41	50.50	**49.62**
Percent of educated farmers	27.28	15.56	27.92	29.24	**25.00**
Other source of income(%)					
Dairy	0.08	0.27	0.08	0.02	**0.11**
Poultry	0.21	0.33	0.12	0.08	**0.19**
Fisheries	0.17	0.28	0.08	0.05	**0.15**
Service	0.01	0.11	0.01	0.06	**0.05**
Farm labour	0.27	0.97	0.03	0.02	**0.32**
Others	0.18	0.30	0.10	0.06	**0.16**
Size of family (no. of individuals)					
Male	5.25	6.15	3.97	5.97	**5.33**
Female	4.5	5.41	4.66	5.45	**5.00**
Children	2.40	2.42	1.30	1.86	**2.00**
Social Grouping (Average)					
General	83	97	63	96	85
OBC	12	0	32	0	11
SC/ST	0	0	0	0	0
Other	5	3	5	4	4

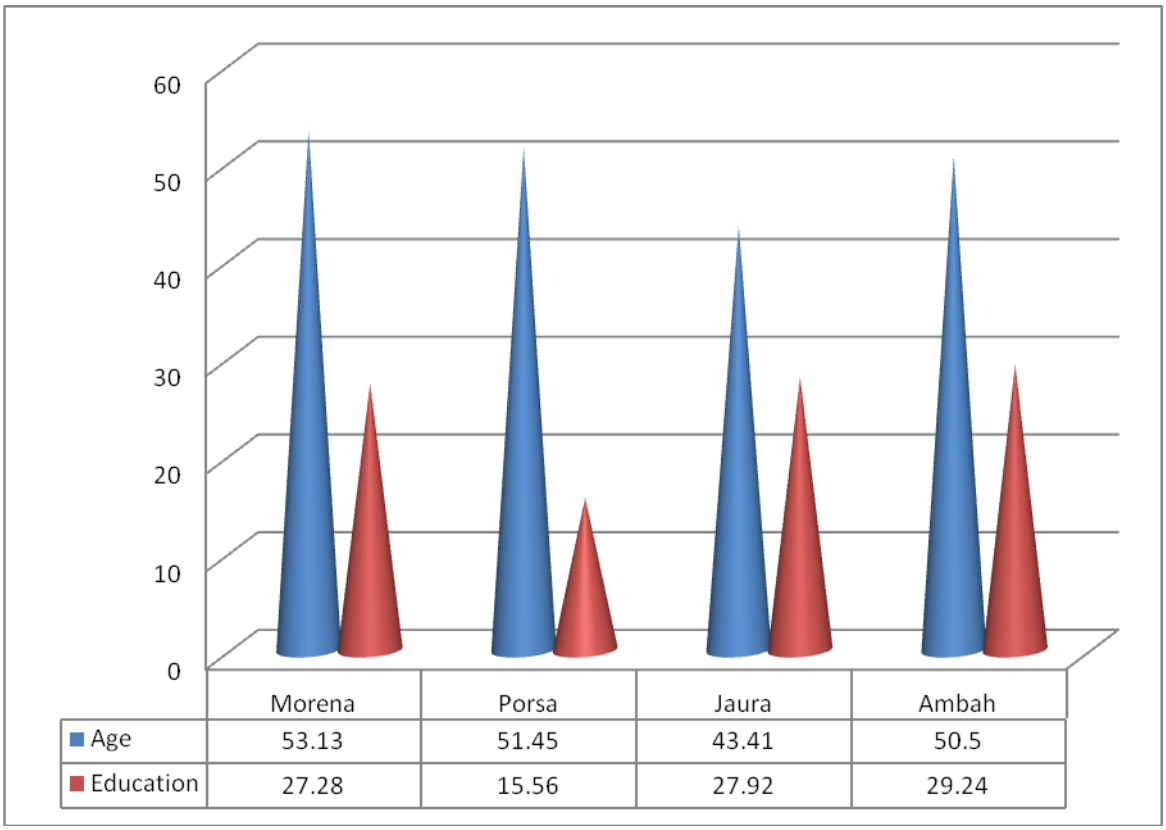


Figure 4.1: Age and Education of sample farmers

4.1.4 Land use and land use pattern

Land is the primary fixed input of production constituting the major portion of the fixed cost. The land use patterns on different selected crops are given in Table 4.2.The average land holding of mustard, wheat, pigeon pea and bajra was found 3.86 ha, 3.71 ha, 3.07 ha and 3.1 ha, respectively. The average land holding of all four crops was 3.43 hectare. As the study area has good water availability (100%) and irrigated and there was no barren land as 100% area under cultivation.

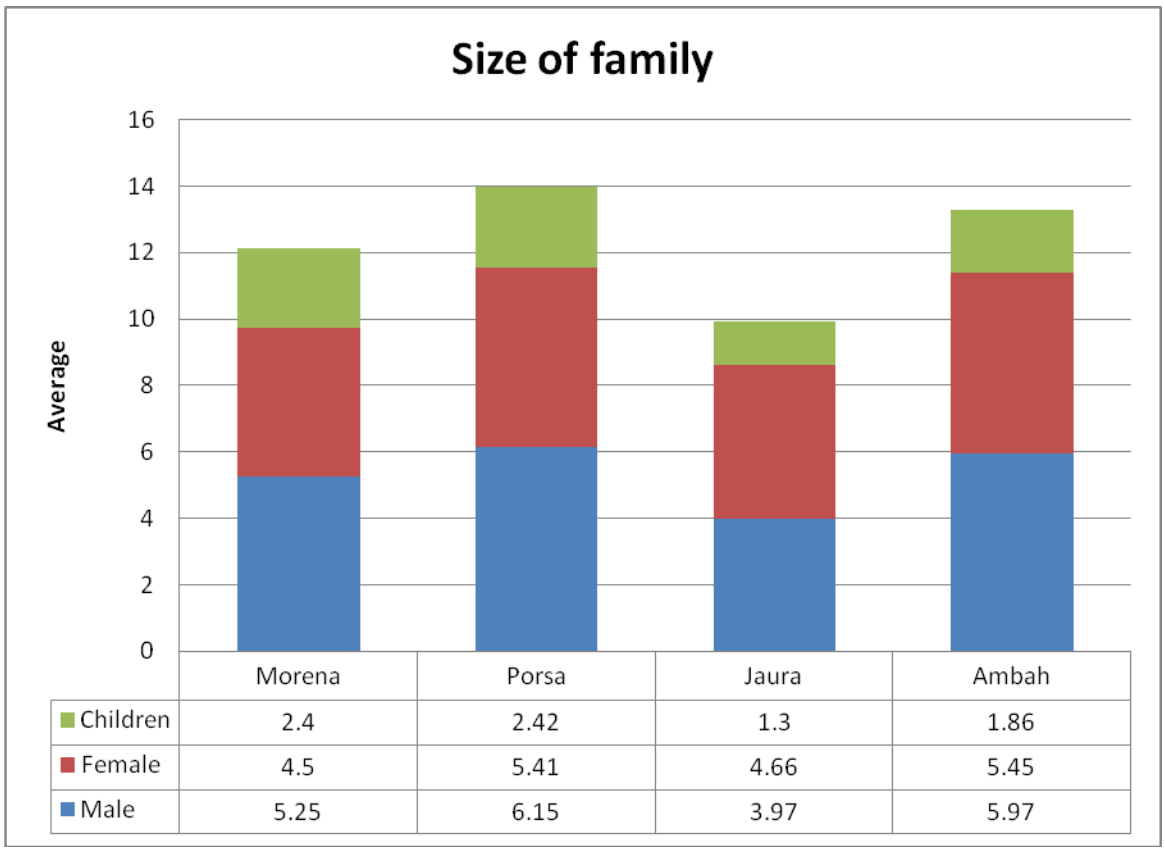
Table 4.2: Land and land use pattern of selected farmers

Particulars	**Mustard**	**Wheat**	**Pigeonpea**	**Bajra**	**Mean**
Total land holding (ha)	3.86	3.71	3.07	3.1	**3.43**
Cultivated area (ha)	3.86	3.71	3.07	3.1	**3.43**
Uncultivated area (ha)	Nil	Nil	Nil	Nil	**Nil**
Irrigated area (ha)	3.86	3.71	3.07	3.1	**3.43**
Un-irrigated area (ha)	Nil	Nil	Nil	Nil	**Nil**
Irrigated area % to cultivated area	**100**	**100**	**100**	**100**	**100**

4.1.5 Other source of income

Agriculture is the main source of income for the studied farmers. Besides agriculture, the other sources of income are dairy, poultry, fisheries, service, farm labour and other kind of income. The dairy, poultry, fisheries, service, farm labour and other kind of income is available to 0.11%, 0.19%, 0.15%, 0.05%, 0.32% and 0.16% farmers, respectively. Among the other sources of income, the farm labour and poultry are the major one available with the farmers (Table 4.1).

4.1.6 Family size



	Morena	Porsa	Jaura	Ambah
Children	2.4	2.42	1.3	1.86
Female	4.5	5.41	4.66	5.45
Male	5.25	6.15	3.97	5.97

Fig. 4.2: Size and composition of family of studiedrespondents

The family of the studied farmers was found to be dominated by the males, followed by females and children (Table 1). The highest number of male, female and children was found in Porsa, Ambah and Porsa block, respectively. On an average, the family constituted 5.33 males, 5 females and 2 children in the study area (Fig. 4.2).

4.1.7 Source of irrigation

The sources of irrigation availed by sample farmers worked-out in Table 4.3 indicates that in whole of the area under study only electric tube-wells and canal were the main sources of irrigation. The crop wise and source wise distribution shows that electric tube-wells irrigation was comparatively more commonly used by the farmers. The average source of irrigation of electric tube-wells is highest (61.25 per cent), followed by canal (24.37 per cent) and bore wells (8.12 per cent). The other sources accounted 6.25 per cent. The good topography of study area and diversified irrigation methods reflected the amazing picture.

Table 4.3: Crop wise and source wise distribution of irrigated area (%)

Sources	Mustard	Wheat	Pigeonpea	Bajra	Mean
Canal	32.5	37.5	18.8	8.8	**24.4**
Electric tube-wells	52.5	51.3	67.5	73.8	**61.3**
Bore wells	12.5	11.3	3.8	5.0	**8.1**
Others	2.5	0.0	10.0	12.5	**6.2**

4.1.8 Farm size and livestock

The present study carried out with engaging a 320 participant farmers, 80 each of mustard, wheat, pigeon pea and bajra growers. The land holding was categorized in four group viz., marginal, small, medium and large farmers. On an average, marginal, small, medium and large farmers constituted 62%, 21%, 10% and 7%, respectively (Table 4.4).

Table 4.4: Distribution of farmers based on land size (%)

Farm size	Mustard	Wheat	Pigeonpea	Bajra	Mean
Marginal	58	63	62	66	**62**
Small	23	21	21	18	**21**
Medium	10	11	9	11	**10**
Large	9	5	8	5	**7**

Livestock possession pattern on sample size of farms is given in Table 4.5. The average number of animals ranged 1.0-1.3 among marginal to large farmers. The marginal, small, medium and large farmers possess 1.0, 1.1, 1.3 and 1.3 animals, respectively in the study area. The buffalo was the animal preferred by medium and large farmers whereas cattle were preferred by marginal and small farmers. The average number of livestock influences

marketed surplus of the crop as farmers preserve part of the crop produce for animal feed.

Table 4.5:Status of livestock in different size of farms (number of individual animals)

Farm size	Cattle	Buffalo	Others	Mean
Marginal	1.2	0.7	1.1	1.0
Small	1.5	1.0	0.8	1.1
Medium	1.2	1.3	1.3	1.3
Large	0.9	1.9	1.1	1.3

4.1.9 Sale price and pattern

4.1.9.1 Sale price received of selected crops

The selling price received for the selected crops viz., mustard, wheat, pigeon pea and bajra has been analyzed and presented in table 4.6. The data revealed that mustard, wheat, pigeon pea and bajra crops received selling price of Rs. 4014, Rs. 1977, Rs. 3000 and Rs. 1519, respectively. The mustard received the highest selling price whereas bajra received lowest selling price among the crops studied.

Table 4.6: Sale price received for different crops

Crops	Sale Price (Rs/qtl)
Mustard	4014
Wheat	1977
Pigeon pea	3000
Bajra	1519

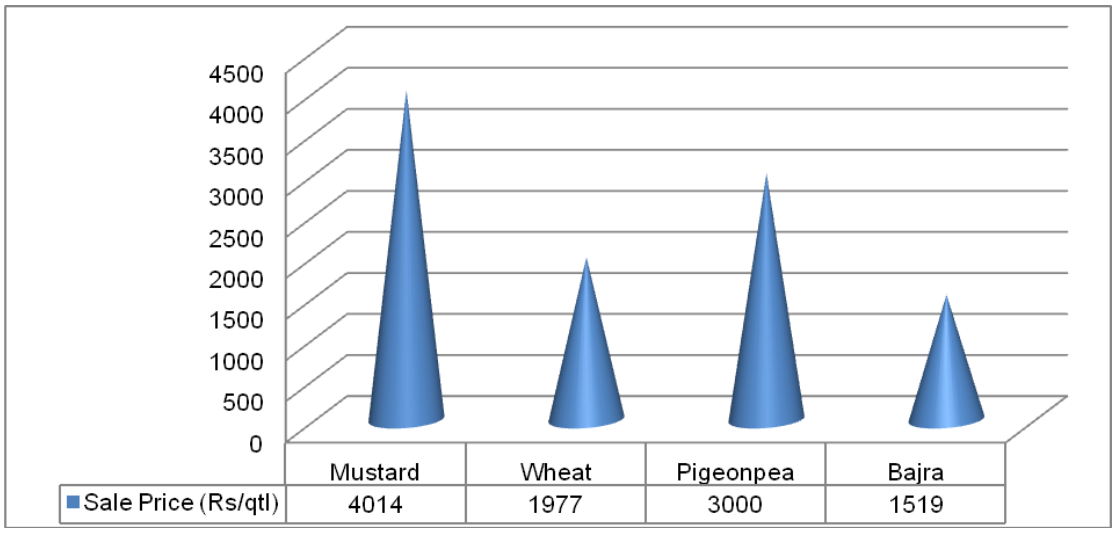


Fig.4.3: Sale Price Received for Different Crops

4.1.9.2 Production and sale pattern of selected crops

The production and sale pattern of selected crops is presented in Table 4.7. The average production of mustard, wheat, pigeon pea and bajra was recorded 78.66 quintals, 145.03 quintals, 62.31 quintals and 31.56 quintals per farm, respectively. The maximum quantity of mustard was found to be sold in the month of October just after the harvest of the crop. Further, a 52.50 per cent of total marketed surplus mustard was sold in Mandi and remaining 28.75, 13.75 and 5 per cent proportion of the marketed surplus was sold to corporate society, processor/miller and village traders, respectively.

Table 4.7: Production and sale Pattern of Selected Crops

Crops		Mustard	Wheat	Pigeonpea	Bajra
Sale in qtl		2911	3536	4894	1475
Average Production (qtl/farm)		78.66	145.03	62.31	31.56
Percentage of marketed surplus sold	Village trader	05.00	0.88	13.75	38.75
	Mandi	52.50	1.01	22.50	08.25
	Processor/ Miller	13.75	0.61	21.25	1.75
	Corporate Society	28.75	97.5	42.50	51.25

The maximum quantity of wheat was found to be sold in the month of April/May just after the harvest of the crop. It is also observed from the data that 97.5 per cent of total marketed surplus had been sold in corporate society and remaining 1.01, 0.88 and 0.62 per cent proportion of the marketed surplus was sold to Mandi, village traders and processor/miller, respectively.

The maximum quantity of pigeonpea was found to be sold in the month of March just after the harvest of the crop. It is observed from the data that 42.50 per cent of total marketed surplus had been sold in corporate society and remaining 22.50, 21.25 and 13.75 per cent proportion of the marketed surplus was sold to Mandi, processor/miller and village traders, respectively.

The maximum quantity of bajra was found to be sold in the month of September just after the harvest of the crop. It is also observed from the data that 51.52 per cent of total marketed surplus had been sold in corporate society and remaining 38.75, 8.25 and 1.75 per cent proportion of the

marketed surplus was sold to village traders, Mandi and processor/miller, respectively.

4.2: Compound growth rateof area, production and productivity of selected crops in Morena district

The compound growth rates for the study period of 2000-01 to 2017-18 are estimated by fitting the compound function to the area, production and productivity ofselected crops, respectively.

4.2.1. Trends of Area, Production and Productivity of Mustard in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Mustard during the study period (2000-01 to 2017-18) was 140.23 thousand hectares. The compound growth rates evidenced during study period were 0.85 per cent per annum (Table 4.8). The area of Mustard in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found highly significant (at 1% level of significance).

Table 4.8: Area, Production and Productivity of Mustard in Morena district

Year	Mustard crops		
	Area (thousand ha)	Production (thousand tonnes)	Productivity (Kg/ha.)
2000-2001	109.7	134.8	1229
2001-2002	125.3	151.2	1207
2002-2003	111.2	88.6	797
2003-2004	135.7	184.5	1359
2004-2005	158.1	202.7	1282
2005-2006	151.1	222.8	1474
2006-2007	146.8	195.4	1331
2007-2008	132.40	186.90	1360
2008-2009	151.40	201	1374
2009-2010	146	219	1600

2010-2011	135	297	2137
2011-2012	154.30	266.10	1720
2012-2013	153	294.70	1892
2013-2014	151	244.20	1596
2014-2015	175.90	167.80	1436
2015-2016	119.20	256.80	1900
2016-2017	121	249.60	1950
2017-2018	147	336	2311
Total	**2524.10**	**3899.10**	**27955**
Average	**140.23**	**216.61**	**1553.05**
CGR (%)	**0.85^{NS}**	**4.48****	**3.82****
'b' value	**1.00**	**1.04**	**1.03**

^{NS} Non significant, **Significant at 0.01 level of probability, *Significant at 0.05 level of probability

Source: DDA Office, Krishi Vibhag, Morena district, Madhya Pradesh

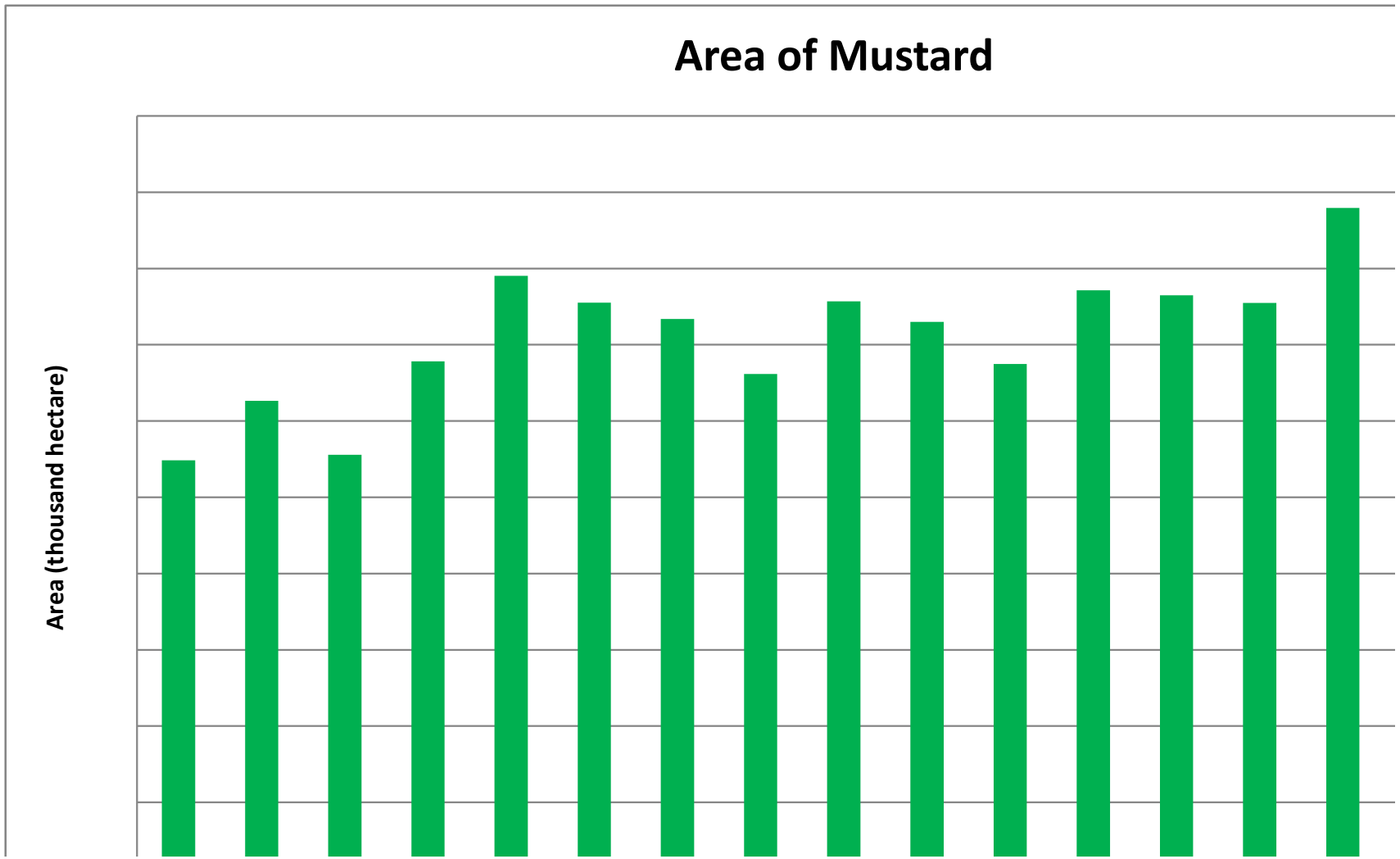


Figure 4.4: Area of Mustard in Morena district from 2000-01 to 2017-18

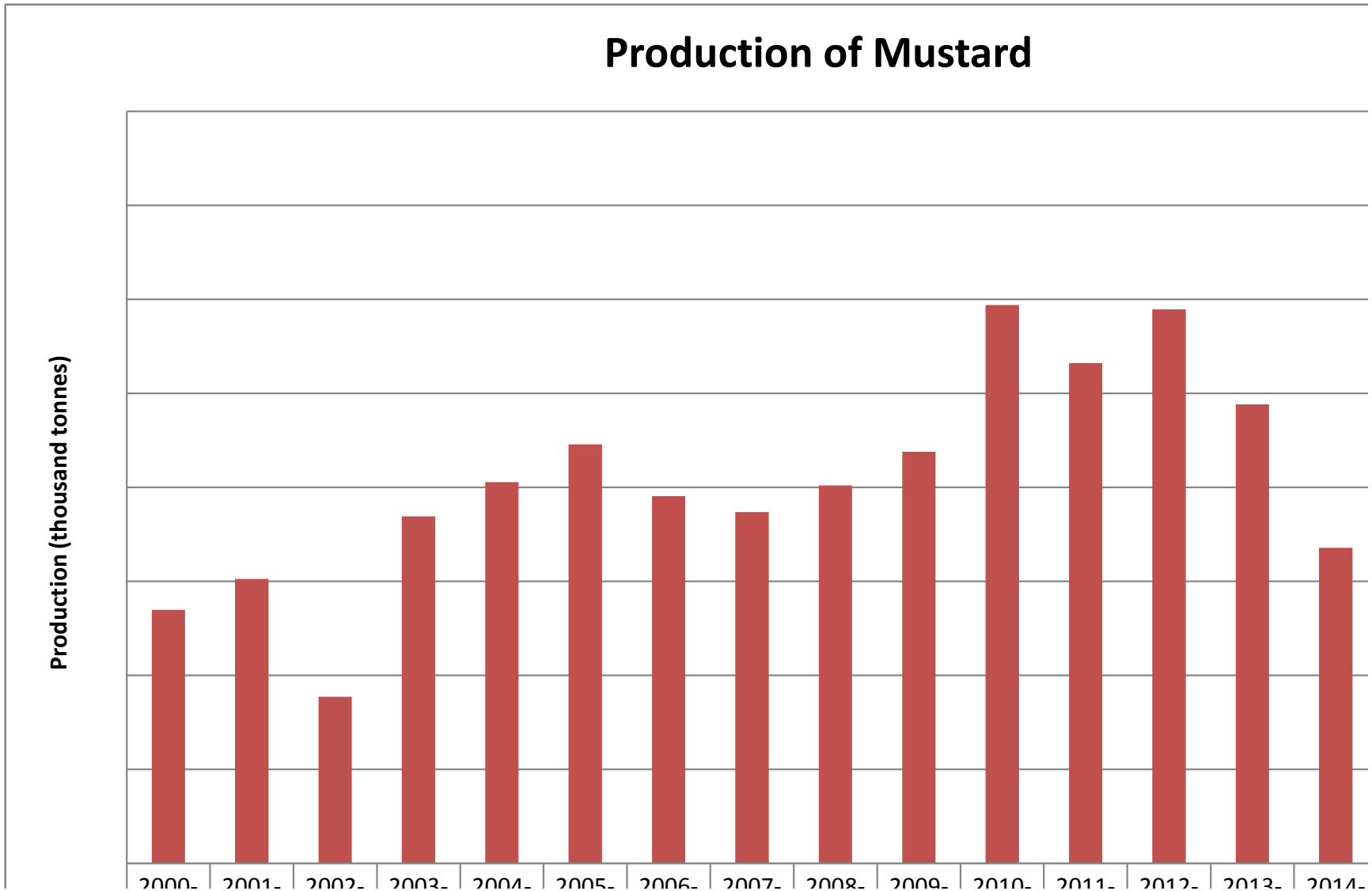


Figure 4.5: Production of Mustard in Morena district from 2000-01 to 2017-18

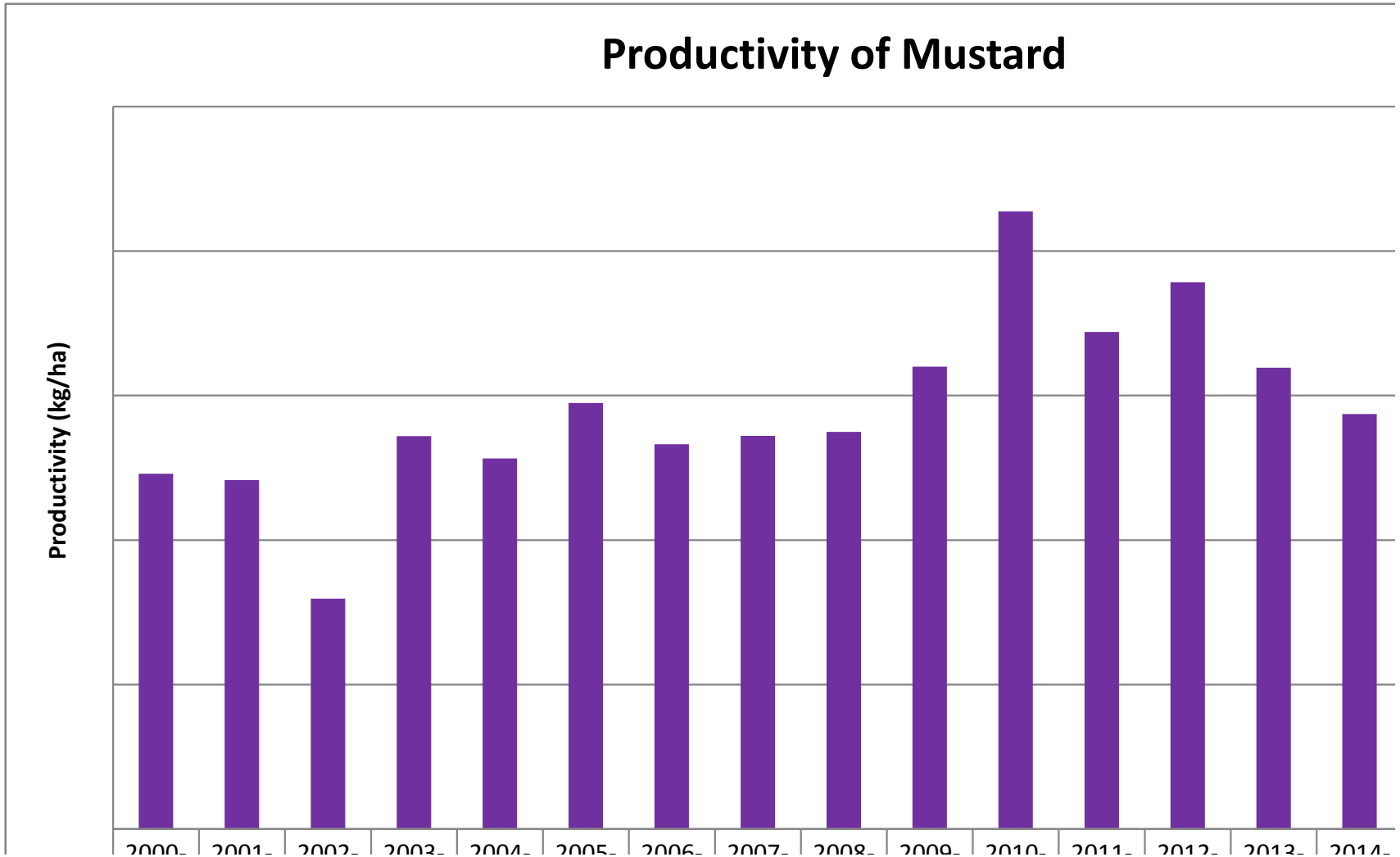


Figure 4.6: Productivity of Mustard in Morena district from 2000-01 to 2017-18

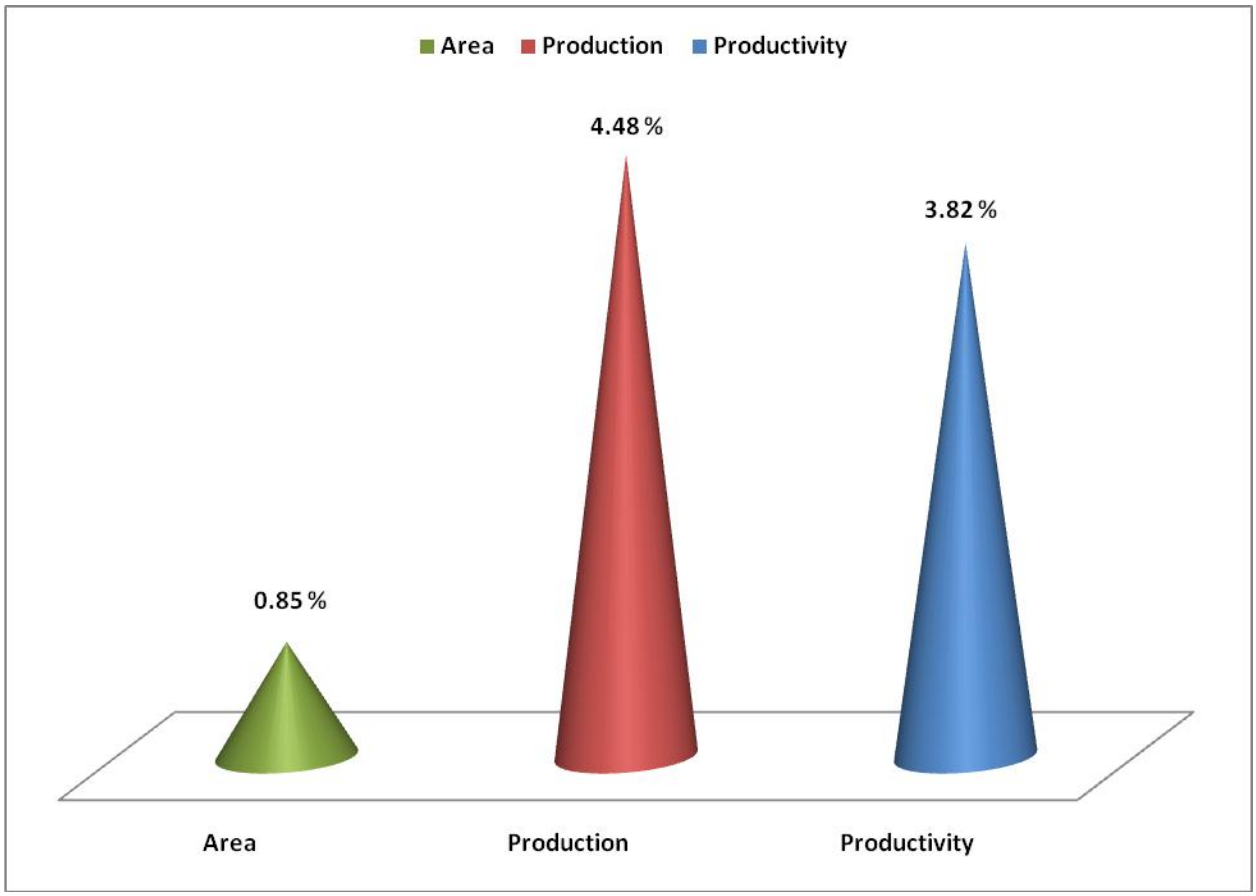


Figure 4.7: Compound growth rate (%) of Area, Production and Productivity of Mustard in Morena district from 2000-01 to 2017-18

In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 216.61 thousand tonnes. Compound growth ratesof production were 4.48 per cent per annum. The production of Mustard in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance. As regards the productivity of Mustard in Morena district of Madhya Pradesh, the average productivity during the study period (2000-01 to 2017-18) was 1553.05 kg/hectare. Compound growth rate observed 3.82 per cent per annum. The productivity growth rates of Mustard in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at (1%) level of significance. As a total, the compound growth rate of production of mustard was higher than its area and productivity.

4.2.2. Trends of Area, Production and Productivity of wheat in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Wheat during the study period (2000-01 to 2017-18) was 83.75 thousandhectares. The compound growth rates evidenced during study period were 2.27 per cent per annum respectively (Table 4.9). The area of Wheat in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance. In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 266.37 thousand tonnes.Compound growth rate of wheat production was 5.22 per cent per annum.

The production of Wheat in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.As regards the productivity of Wheat in Morena district of Madhya Pradesh the average productivity during the study period (2000-01 to 2017-18) was 3132.44 kg/hectare. Compound growth rate observed was 1.78 per cent. The productivity growth rates of Wheat in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at (1%) level of significance. As a total, the compound growth rate of production of wheat was higher than its area and productivity.

Table 4.9: Area, Production and Productivity of wheat in Morena district

Year	Wheat crops		
	Area (thousand ha)	Production (thousand tonnes)	Productivity (Kg/ha.)
2000-2001	75.6	218.3	3008
2001-2002	67	181.5	2824
2002-2003	66.6	150.3	2352
2003-2004	71.9	210.4	3046
2004-2005	67.8	207.3	3184
2005-2006	68.2	216.8	3312
2006-2007	75.2	221.9	3071
2007-2008	78.3	159.8	3071
2008-2009	80.4	184.8	2126
2009-2010	81.5	179.8	2396
2010-2011	96	221.8	2298
2011-2012	104	412	3959
2012-2013	101	382	3801
2013-2014	95	400	3164
2014-2015	125	378	3022
2015-2016	99	420	4250
2016-2017	80	300	3500
2017-2018	75	350	4000
Total	**1507.5**	**4794.7**	**56384**
Average	**83.75**	**266.37**	**3132.44**
CGR (%)	**2.27****	**5.22****	**1.78***
'b' value	**1.02**	**1.05**	**1.01**

NS Non significant, **Significant at 0.01 level of probability, *Significant at 0.05 level of probability

Source: DDA Office, Krishi Vibhag, Morena district, Madhya Pradesh

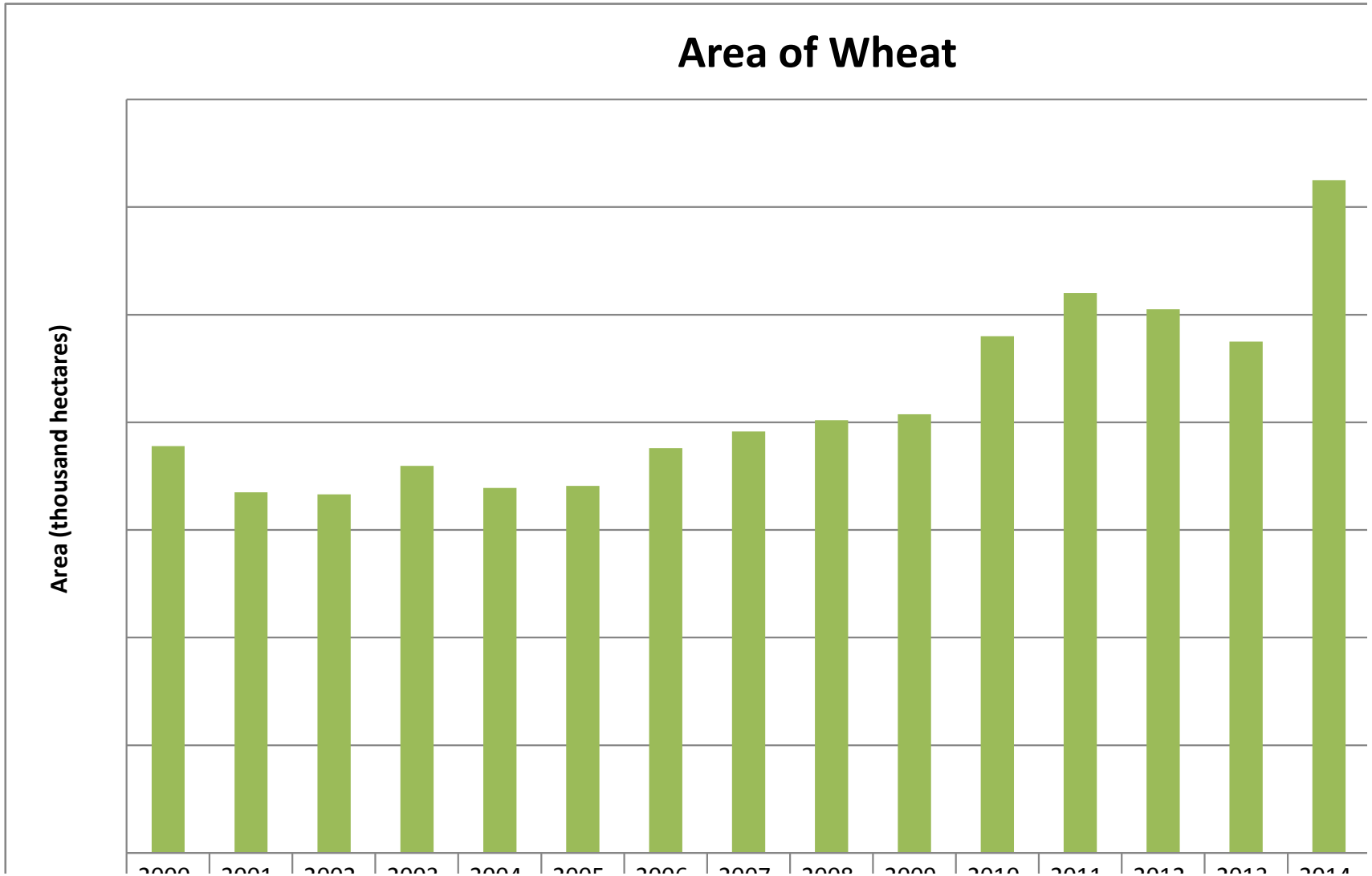


Fig. 4.8: Area of Wheat in Morena district from 2000-01 to 2017-18

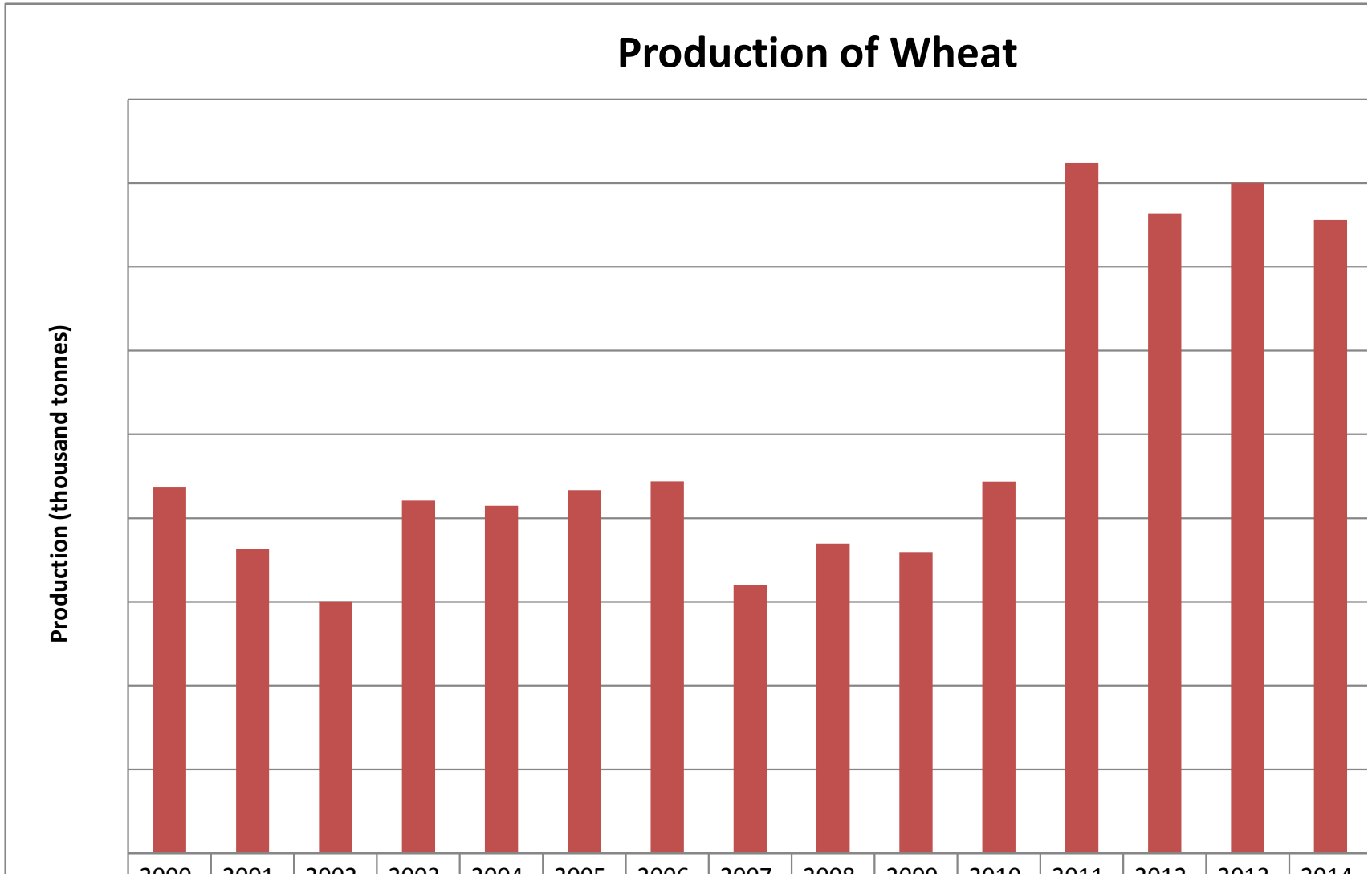


Fig. 4.9: Production of Wheat in Morena district from 2000-01 to 2017-18

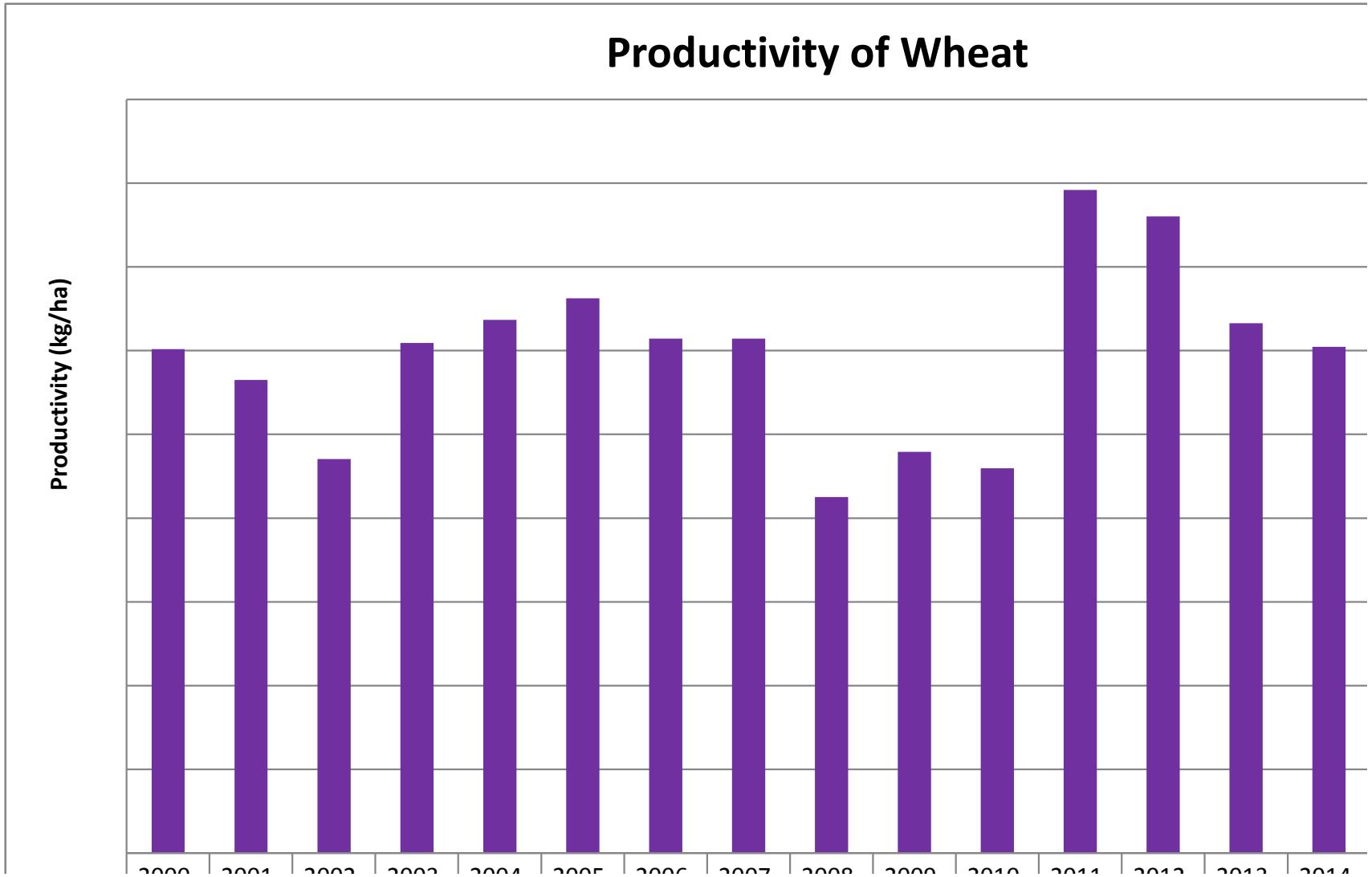


Fig. 4.10: Productivity of Wheat in Morena district from 2000-01 to 2017-18

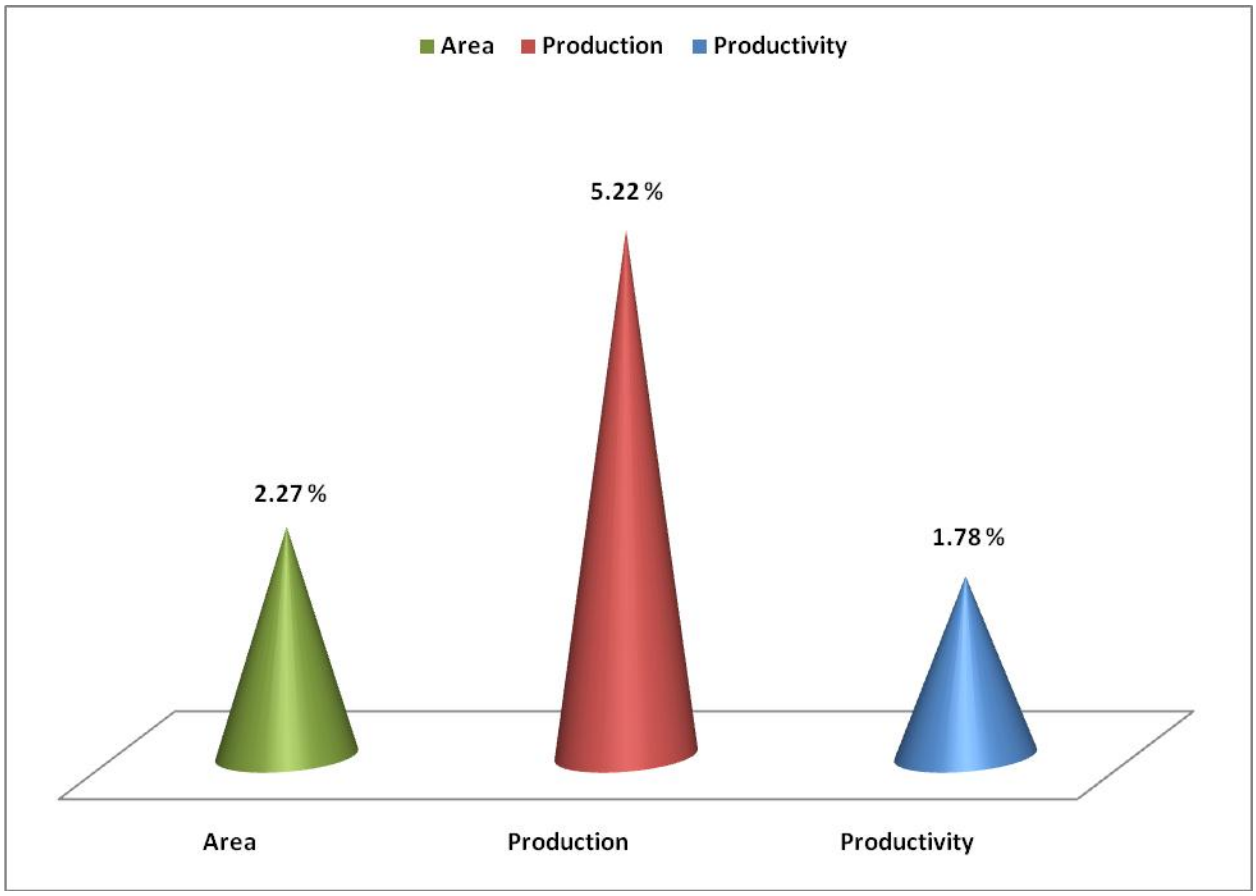


Fig. 4.11: Compound growth rates(%) of Area, Production and Productivity of Wheat in Morena district from 2000-01 to 2017-18

4.2.3. Trends of Area, Production and Productivity of Pigeonpea in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Pigeonpea during the study period (2000-01 to 2017-18) was 10.04 thousandhectares.

The compound growth rates evidenced during study period were 9.47 per cent per annum respectively (Table 4.10). The area of Pigeonpea in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.

In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 16.23 thousand tonnes. The compound growth rate of production was 17.47 per cent per annum. The production of Pigeonpea in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.

As regards the productivity of Pigeonpea in Morena district of Madhya Pradesh the average productivity during the study period (2000-01 to 2017-18) was 1243.66 kg/ha. Compound growth rate observed was 6.67 per cent. The productivity growth rates of Pigeonpea in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at (1%) level of significance.

As a total the compound growth rate of production of pigeonpea was higher than its area and productivity.

Table 4.10: Area, Production and Productivity of Pigeonpea in Morena district

Year	Pigeonpea crops		
	Area (thousand ha)	Production (thousand tonnes)	Productivity (Kg/ha.)
2000-2001	7.8	6.8	872
2001-2002	7.0	7.1	1081
2002-2003	5.1	3.0	592
2003-2004	5.2	4.0	769
2004-2005	3.8	3.0	788
2005-2006	4.5	3.5	790
2006-2007	4.1	2.7	675
2007-2008	4.30	3.20	790
2008-2009	2.50	2.50	867
2009-2010	7.50	5.80	750
2010-2011	9.60	14.00	1074
2011-2012	8.40	15.40	1791
2012-2013	16.00	32.09	1899
2013-2014	20.00	41.90	2095
2014-2015	8.00	16.80	2100
2015-2016	23.00	48.10	2250
2016-2017	29.00	62.30	2150
2017-2018	15.00	20.00	1053
Total	**180.80**	**292.19**	**22386**
Average	**10.04**	**16.23**	**1243.66**
CGR (%)	**9.47****	**17.47****	**6.67****
'b' value	**1.09**	**1.17**	**1.06**

^{NS} Non significant, **Significant at 0.01 level of probability, *Significant at 0.05 level of probability

Source: DDA Office, Krishi Vibhag, Morena district, Madhya Pradesh

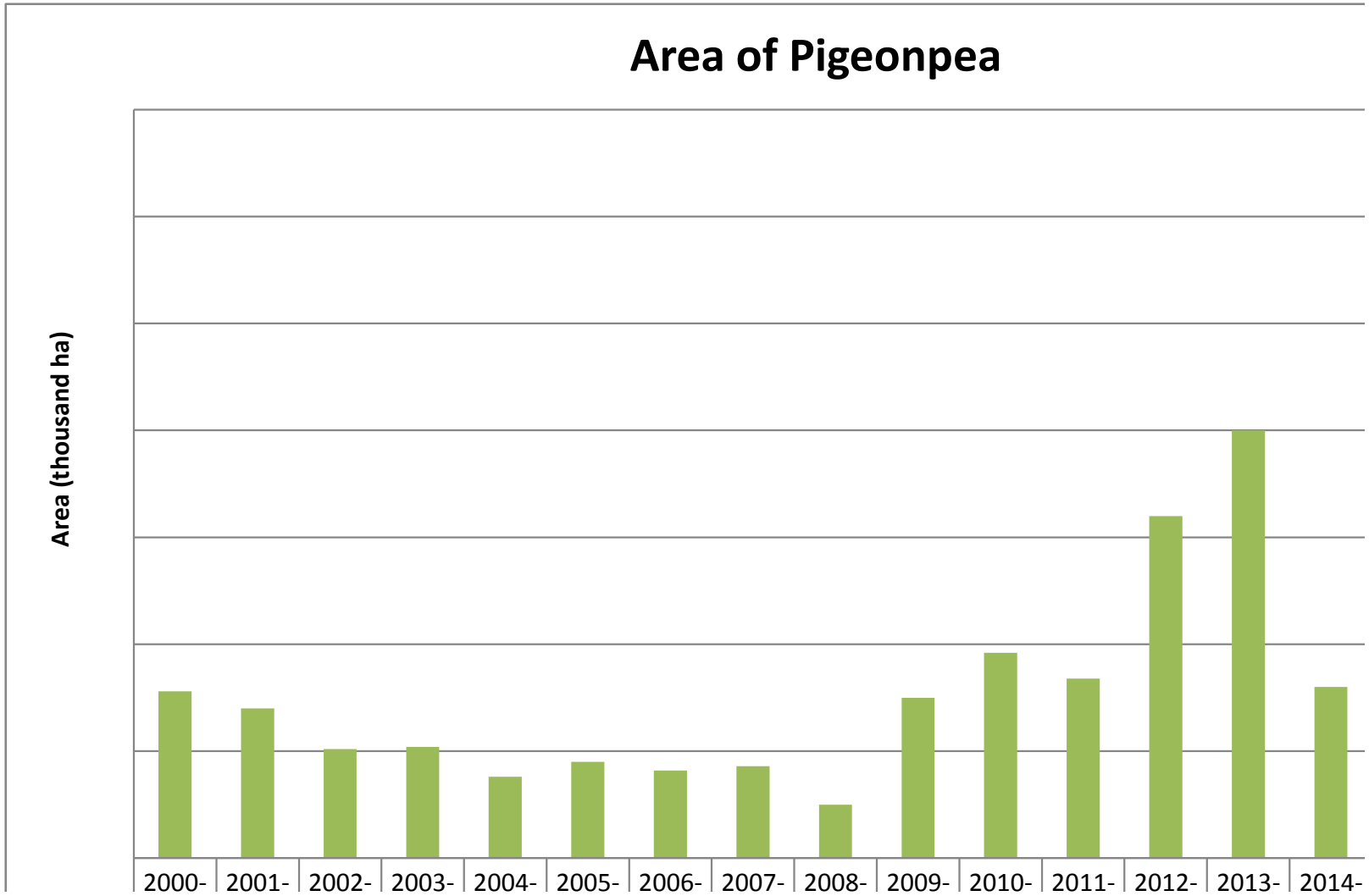


Fig.4.12: Area of Pigeon pea in Morena district from 2000-01 to 2017-18

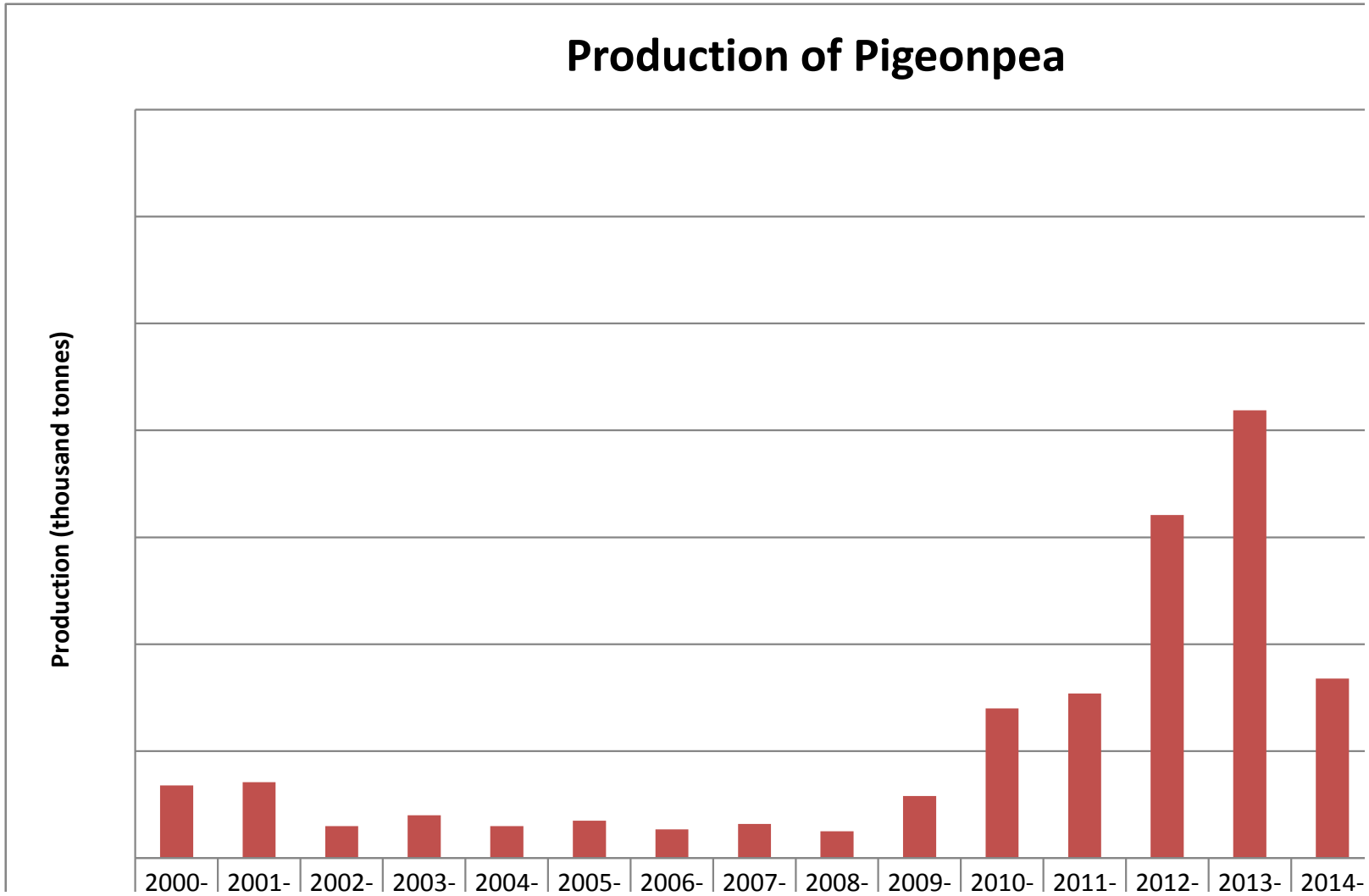


Fig. 4.13: Production of Pigeon pea in Morena district from 2000-01 to 2017-18

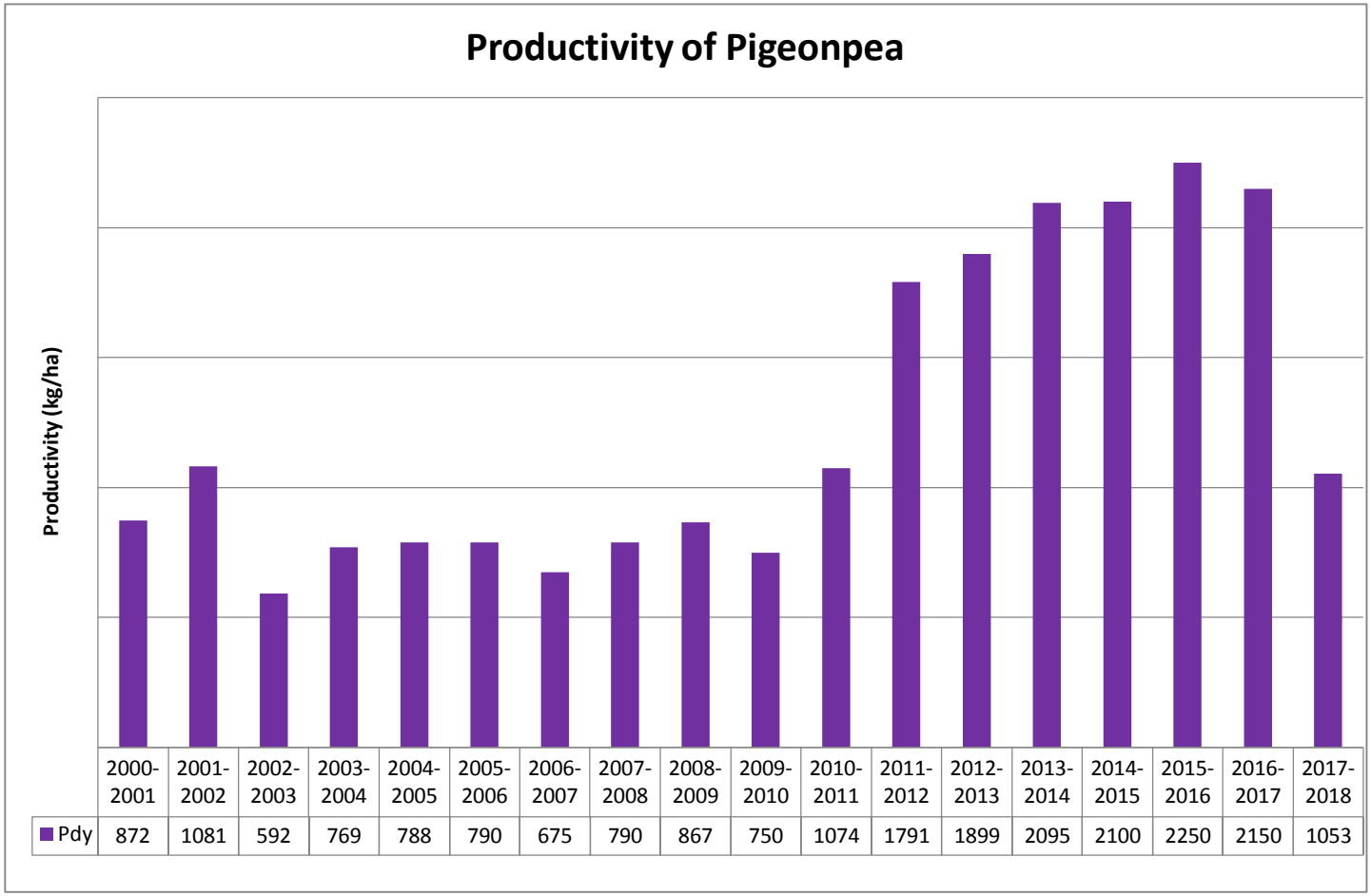


Fig. 4.14: Productivity of Pigeon pea in Morena district from 2000-01 to 2017-18

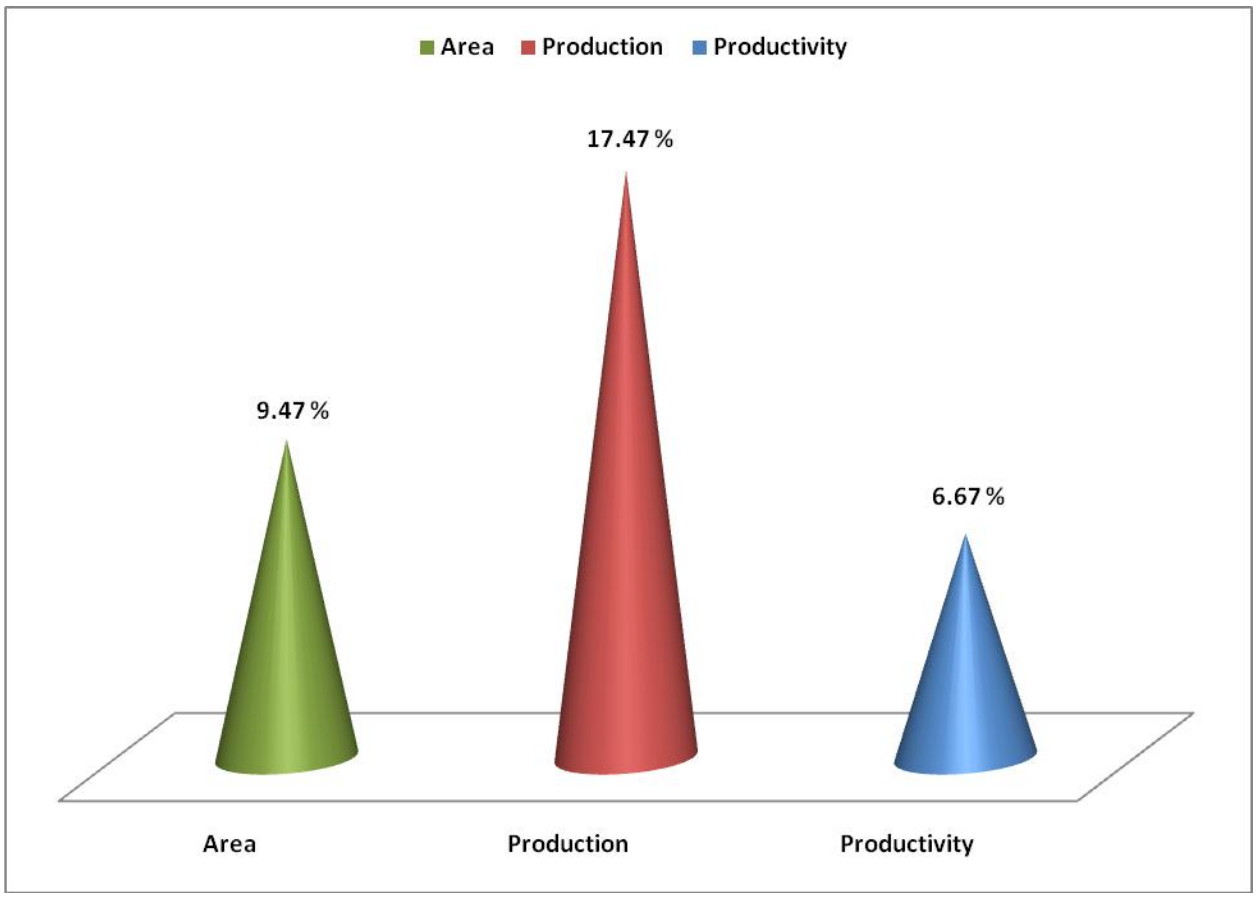


Fig. 4.15: Compound growth rates(%) of Area, Production and Productivity of Pigeon pea in Morena district from 2000-01 to 2017-18

4.2.4. Trends of Area, Production and Productivity of Bajra in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Bajra during the study period (2000-01 to 2017-18) was 90.58thousand hectares. The compound growth rates evidenced during study period were 4.11 per cent per annum (Table 4.11). The area of Bajra in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.

In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 205.86 thousand tonnes. The compound growth rate was 8.75 per cent per annum.The production of Bajra in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.

As regards the productivity of Bajra in Morena district of Madhya Pradesh the average productivity during the study period (2000-01 to 2017-18) was 2048.88 kg/hectare. Compound growth rate observed was 4.35 per cent. The productivity growth rate of Bajra in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at (1%) level of significance.

As a total, the compound growth rate of production of bajra was higher than its area and productivity.

Table 4.11: Area, Production and Productivity of Bajra crop in Morena district

Year	Bajra crop		
	Area (thousand ha)	Production (thousand tonnes)	Productivity (Kg/ha.)
2000-2001	73.9	124.0	1677
2001-2002	70.2	122.0	1738
2002-2003	73.3	68.9	940
2003-2004	76.80	131.1	1707
2004-2005	73.80	129.1	1756
2005-2006	73.80	156.4	1961
2006-2007	82.70	145.7	1761
2007-2008	59.40	160.90	1800
2008-2009	87.50	142.20	1625
2009-2010	75.03	123.80	1650
2010-2011	72.70	164.50	1705
2011-2012	80.00	218.20	2446
2012-2013	92.70	221.70	2379
2013-2014	101.50	262.30	2585
2014-2015	122.20	350.00	2650
2015-2016	130.40	410.50	3050
2016-2017	143.50	413.20	2900
2017-2018	141.10	361.00	2550
Total	**1630.53**	**3705.5**	**36880**
Average	**90.58**	**205.86**	**2048.88**
CGR (%)	**4.11****	**8.75****	**4.35****
'b' value	**1.04**	**1.08**	**1.04**

^{NS} Non significant, **Significant at 0.01 level of probability, *Significant at 0.05 level of probability

Source: DDA Office, Krishi Vibhag, Morena district, Madhya Pradesh

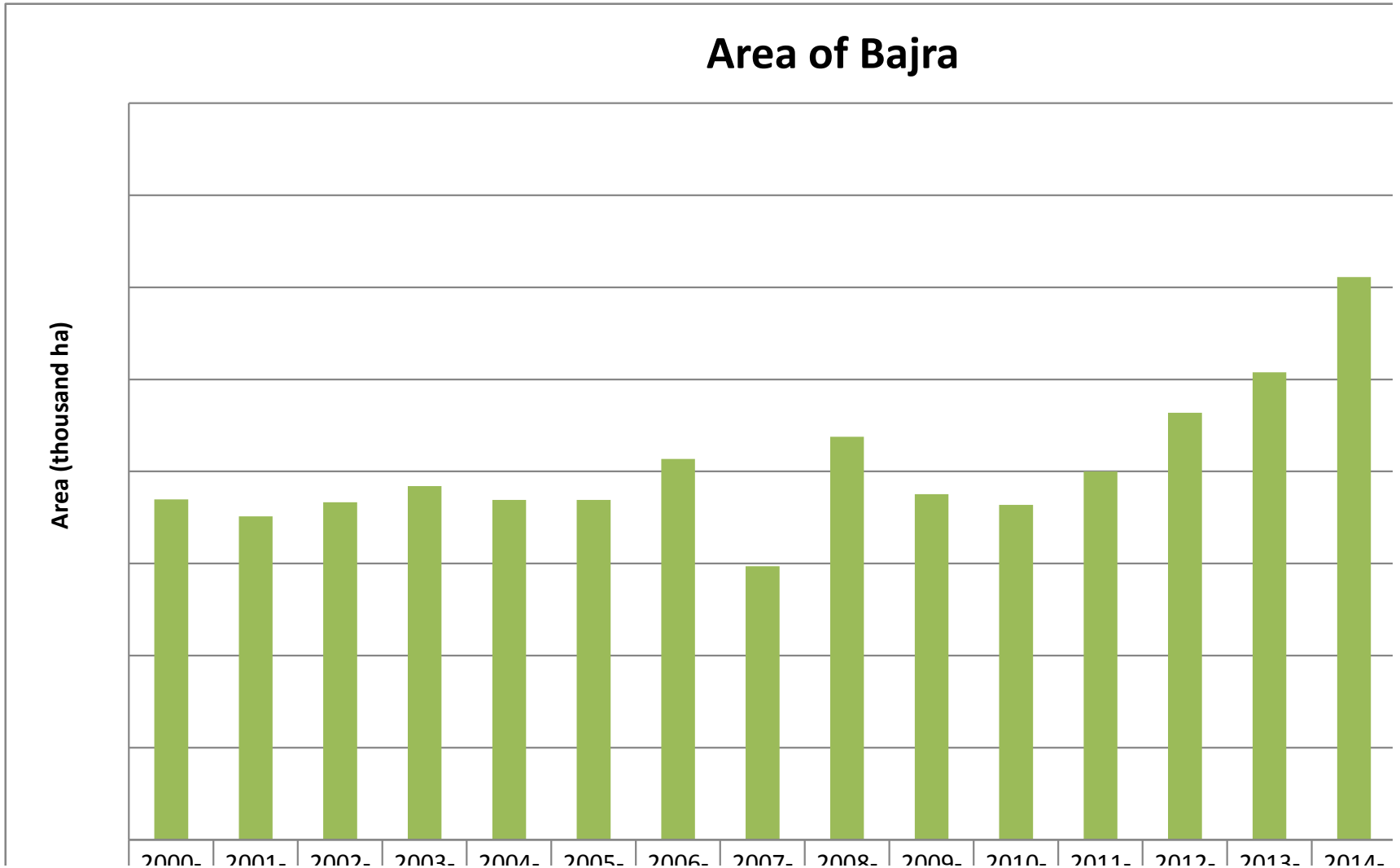


Fig. 4.16: Area of Bajra in Morena district from 2000-01 to 2017-18

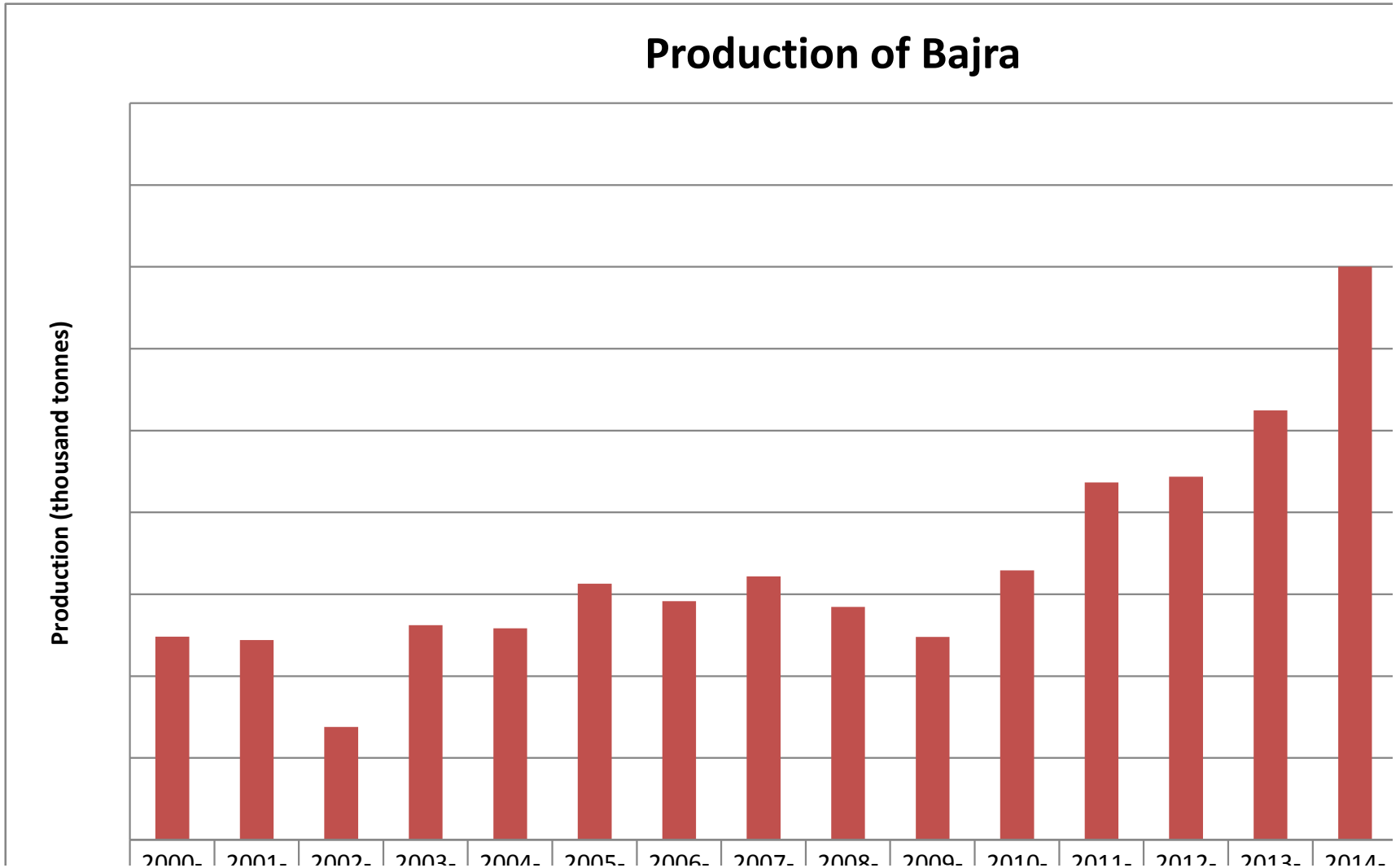


Fig. 4.17: Production of Bajra in Morena district from 2000-01 to 2017-18

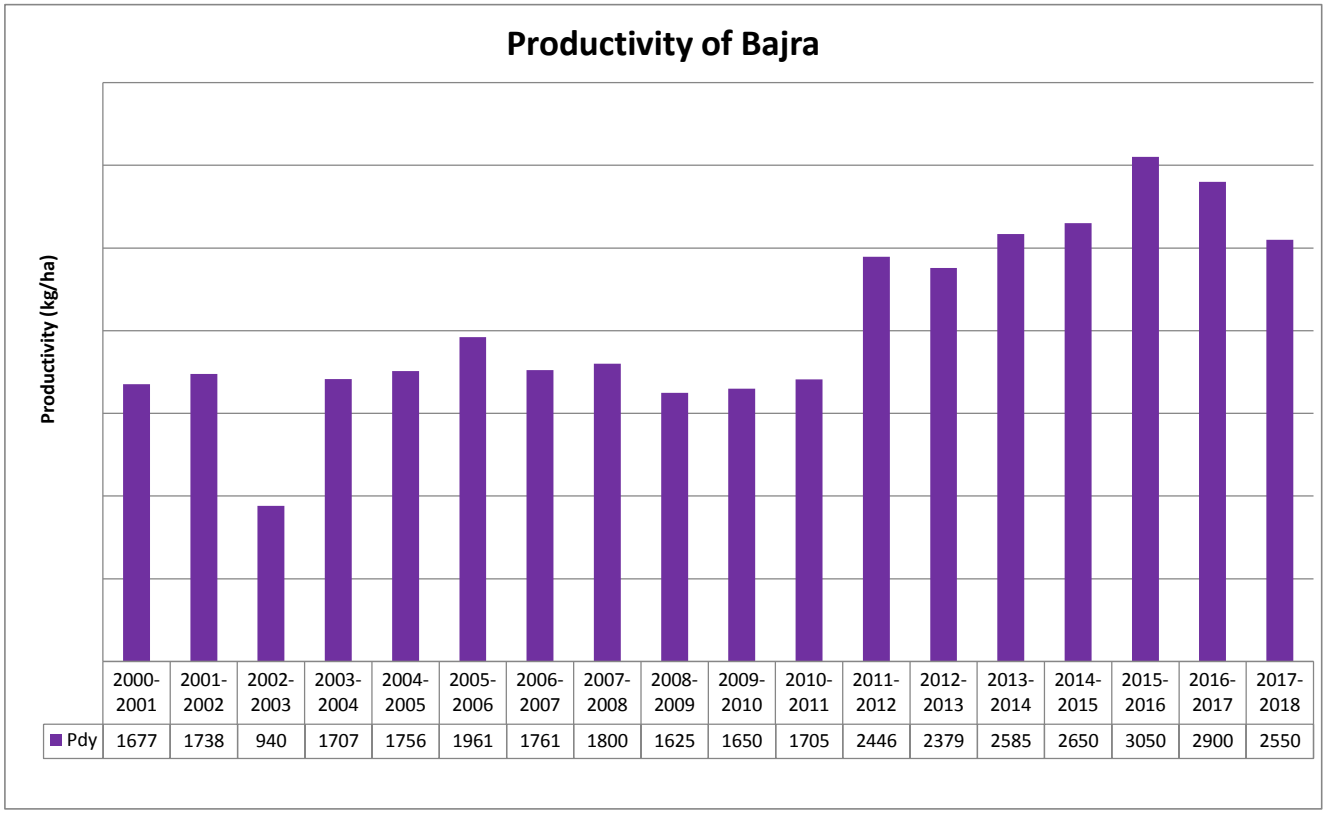


Fig. 4.18: Productivity of Bajra in Morena district from 2000-01 to 2017-18

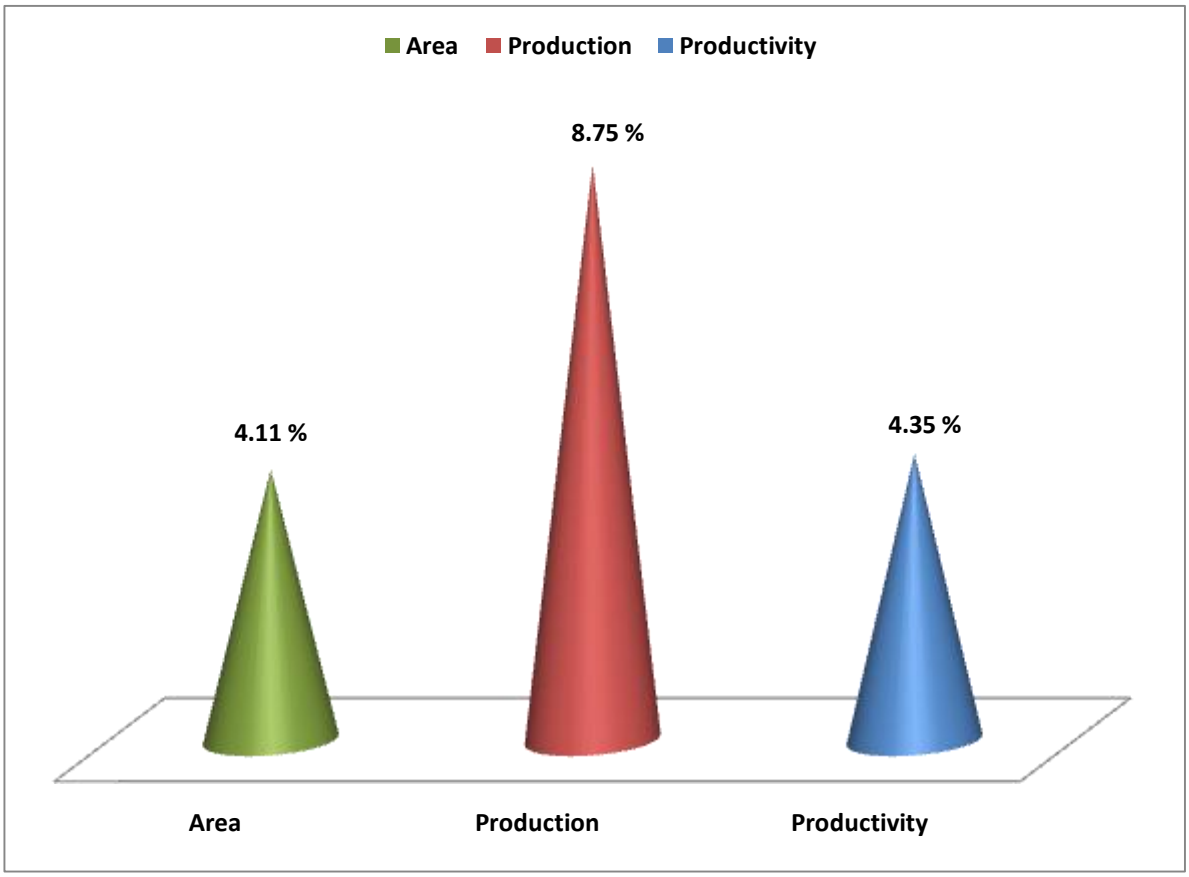


Fig. 4.19: Compound growth rates (%) of Area, Production and Productivity of Bajra in Morena district from 2000-01 to 2017-18

Analysis of the growth trends in the area, production and productivity of major crops over a period of time at national, state or district level has remained issues of significant concern for researcher as well as policy makers. It has been argued that analysis of the growth rate trends help us to indentifying the changing pattern of crops and land user pattern under different crops and rate of change in area, production and productivity of a crop and further help in designing the appropriate agricultural policy for a region or state.

It is clear from the above result that growth in production of wheat, pigeonpea and bajra in Morena district was largely attributable to the growth in both productivity and area implying that the increase in production of these

crops was mainly due to the increase in its productivity and area. The significant growth in the production of mustard in the Morena district has come mainly from the growth in productivity. Konar and Dey (2018), Abid saleem et al. (2014), Singh piyush et al. (2018) and Singh neeraj et al. (2018) also reported similar results in respect of area, production and productivity of mustard, bajra, pigeonpea and wheat crops.

4.3: Marketable and marketed surplus of selected crops in Morena

In estimation of marketable and marketed surplus, sale price, information regarding marketed surplus and sale pattern and realized price related to selected crops i.e. mustard, wheat, pigeonpea and bajra have been analyzed and dealt in this sub head.

Information regarding marketed surplus has been analyzed for mustard, wheat, pigeonpea and bajra and shown in Table 4.12. Overall, on the sample farms the total per farm production of mustard, wheat, pigeonpea and bajra was 6294 quintals, 11603 quintals, 4985 quintals and 2525 quintals, respectively.The marketed surplus accounted for mustard, wheat, pigeon pea and bajra was 2911 quintals, 3536 quintals, 4894 quintals and 1475 quintals, respectively. On an average, mustard, wheat, pigeon pea and bajra crops received selling price of Rs. 4014, Rs. 1977, Rs. 3000 and Rs. 1519, respectively. The mustard, wheat and bajra accounted 3096 quintal, 6141 quintal, 734 quintal storage whereas pigeonpea was not stored at all.

Table 4.12: Total production, marketed surplus, selling price and storage of major crops on Farm basis in Morena district.

Crops	Total production (qtl)	marketed surplus (qtl)	Selling price (Rs/qtl)	storage(qtl)
Mustard	6294	2911	4014	3096
Wheat	11603	3536	1977	6141
Pigeonpea	4985	4894	3000	00
Bajra	2525	1475	1519	734

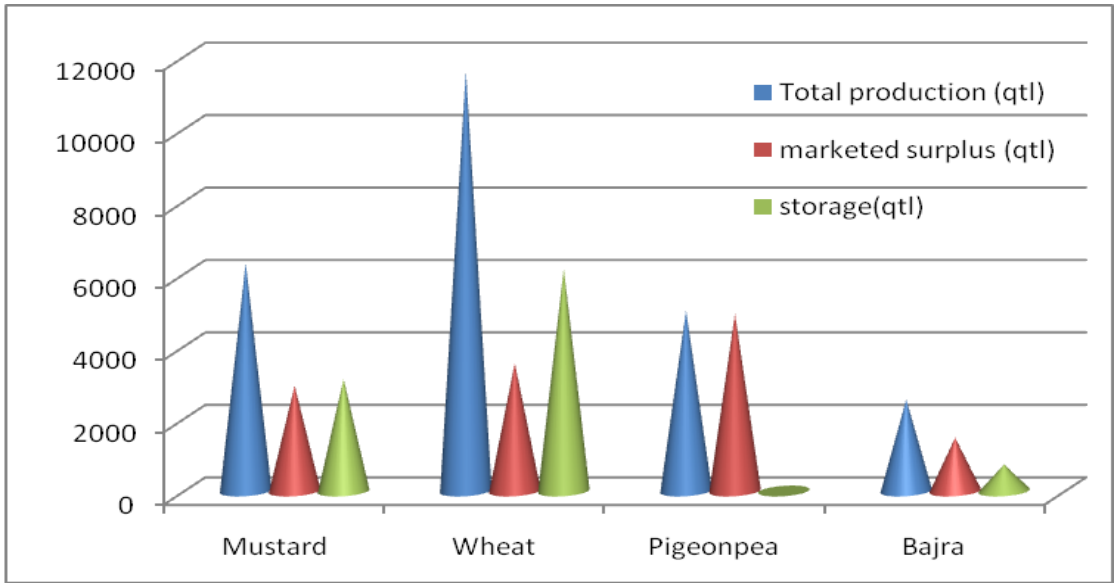


Fig.4.20: Total production, marketed surplus and storage of various crops

Marketable surplus is total requirement of the farmers. It is observed from the data that the maximum average total production, family consumption, seed and feed was recorded 317.56 quintal, 11.90 quintals, 12.69 quintals and feed 1.83 quintals, respectively. The total requirement was recorded as 26.42 quintals. There was no requirement for the wages (Table 4.13).It is observed from the data that marketed surplus of mustard, wheat and bajra was found to be less than marketable surplus in different crops. Marketed surplus of pigeonpea was found to be more than marketable surplus. Marketable surplus of mustard, wheat, pigeonpea and bajra was initiate to be maximum in wheat 126.26 quintals followed by mustard 76.29 quintals, pigeonpea 61.16 quintals and bajra 27.43 quintals. Marketed surplus of mustard, wheat, pigeonpea and bajra was initiate to be maximum in pigeonpea 61.17 quintals followed by wheat 44.19 quintals, mustard 36.38 quintals and bajra 18.43 quintals.

Table 4.13: Production, requirement, marketable surplus and marketed surplus of major crops (Farm basis)

Crops	Total Production	Requirement				Total Requirement	Marketable Surplus	Marketed Surplus
		Family consumption	Seed	Feed	wages			
Mustard	78.66	0.35	1.69	0.33	00	**2.37**	76.29	36.38
Wheat	145.03	7.95	9.7	1.12	00	**18.77**	126.26	44.19
Pigeonpea	62.31	0.94	0.21	00	00	**1.15**	61.16	61.17
Bajra	31.56	2.66	1.09	0.38	00	**4.13**	27.43	18.43
	317.56	**11.90**	**12.69**	**1.83**	**00**	**26.42**	**291.14**	**160.17**

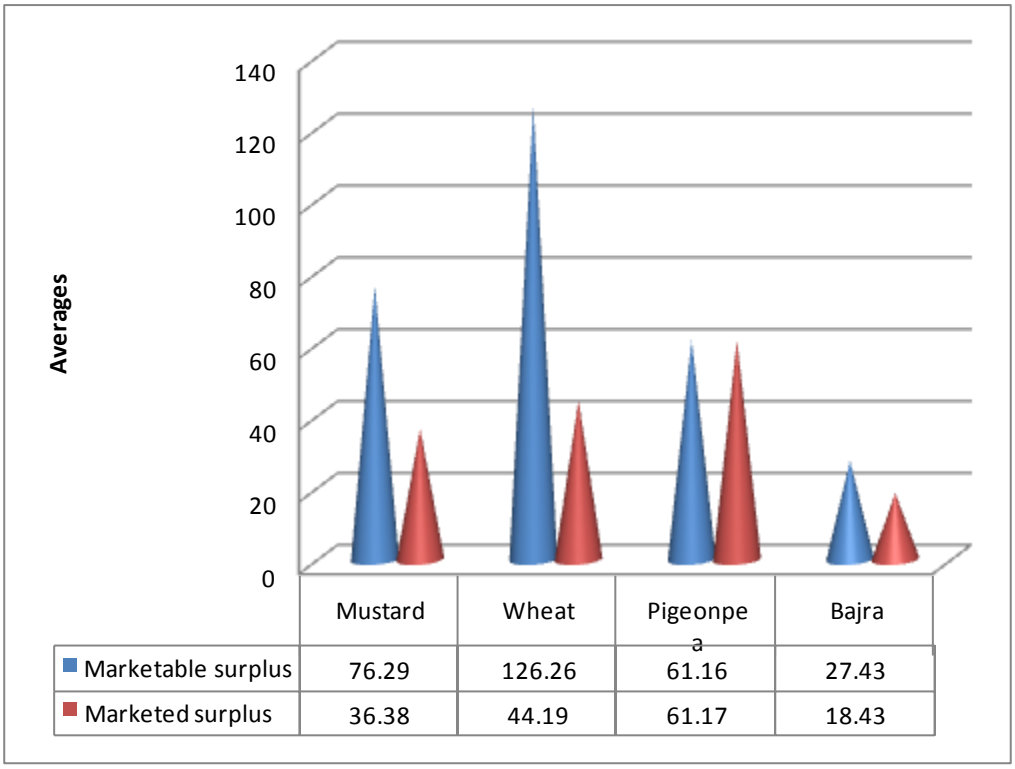


Fig. 4.21: Marketable and marketed surplus in different crops

4.4: Estimation of farm retention for consumption seed, feed, wages and other payments in kind

Farm retention pattern related to selected crops (mustard, wheat, pigeonpea and bajra) has been analysis and show in Table 4.14. The retention consists of quantity kept for family consumption, seed, feed, wages and payments in kind laborers, gifts and others. An average total retention

found to retain 26.42 quintal of mustard, wheat, pigeonpea and bajra for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 12.69 quintal was found to be highest followed by family consumption 11.90 quintals and feed 1.83 quintal. There is no wages and payments in kind, respectively.

An average mustard grower found to retain 2.37 quintal of mustard for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 1.69 quintal was found to be highest followed by family consumption 0.35 quintal, and feed 0.33 quintal. There is no wages and payments in kind, respectively.

An average wheat grower found to retain 18.77 quintal of wheat for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 9.7 quintal was found to be highest followed by family consumption 7.95 quintals and feed 1.12 quintal. There is no wages and payments in kind, respectively.

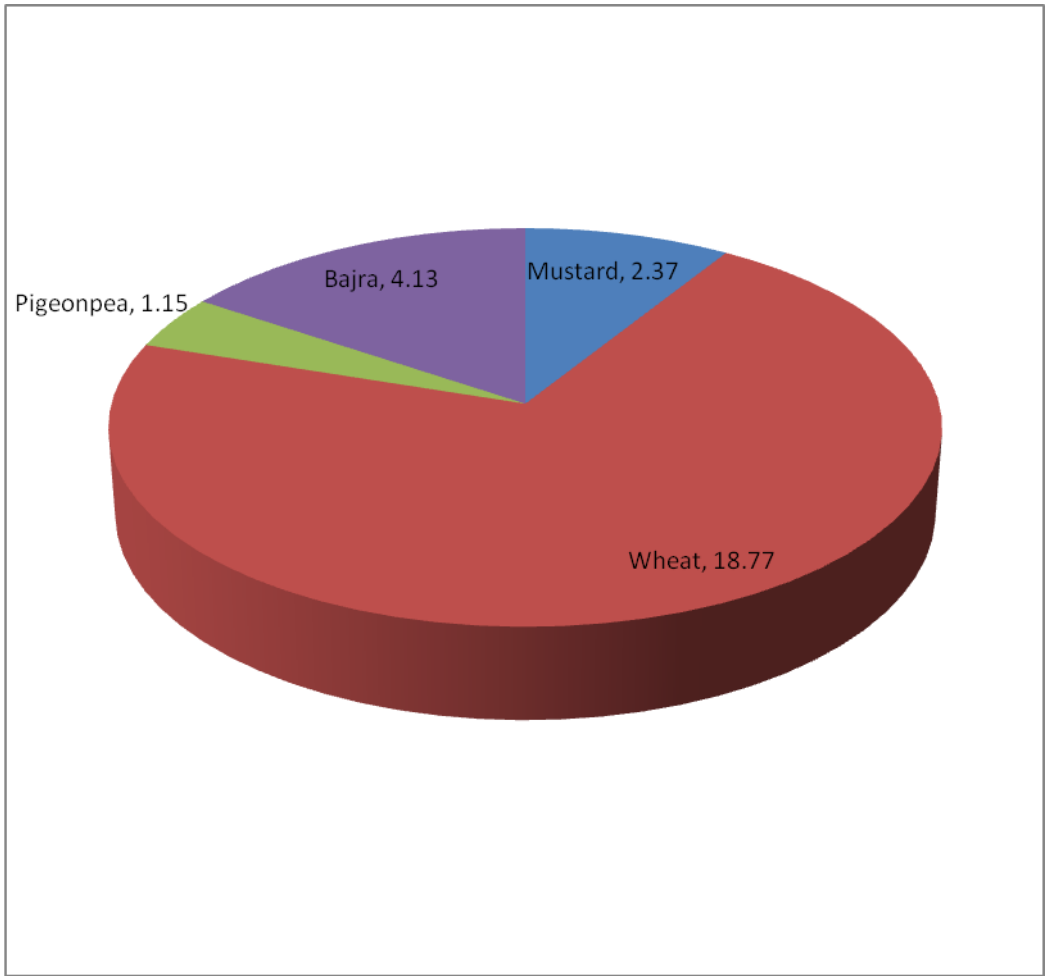


Fig. 4.22: Total Retention Pattern of selected crops in Morena district

Table 4.14: Crops Retention Pattern of selected crops in Morena district(qtl)

Crops	Family consumption	Seed	Feed	Wages	Payments in kinds	Total retention
	1	**2**	**3**	**4**	**5**	**(1 to 5)**
Mustard	0.35	1.69	0.33	00	00	**2.37**
Wheat	7.95	9.7	1.12	00	00	**18.77**
Pigeonpea	0.94	0.21	00	00	00	**1.15**
Bajra	2.66	1.09	0.38	00	00	**4.13**
All Crops	**11.90**	**12.69**	**1.83**	**00**	**00**	**26.42**

An average pigeonpea grower was found to retain 1.15 quintal of pigeonpea for family consumption, seed, feed, wages and payments in kinds. Out of which the average of family consumption 0.94 quintal was found to be

highest followed by seed 0.21quintal. There is no feed, wages and payments in kind for pigeon pea.On an average, bajra grower was found to retain 4.13 quintal of bajra for family consumption, seed, feed, wages and payments in kinds. Out of which the average of family consumption 2.66 quintal was found to be highest followed by seed 1.09 quintal and feed 0.38 quintal. There is no wages and payments in kind, respectively.

4.5: Examine factor influencing marketable and marketed surpluses

Appreciative the behavior of marketed surplus and factors influencing it can help in designing sound policies related to agricultural marketing, pricing, buffer stocks, market infrastructure, etc. The marketable surplus of a crop depends on various price and non-price factors such as the accessibility of cultivated land under the crop, family size, income, risk and uncertainties. In order to identify the pattern of marketed surplus of mustard, wheat, pigeonpea, bajra and variable influencing it, data collected duringinvestigation from Morena for four major crops viz., mustard, wheat, pigeonpea and bajra during from 2000-01 to 2017-18 was used.The predictableregressionparameters of the marketed surplus model are shown in Table 4.15. As estimated, variables like size of family (no.), size of land holding, size of area under crops, price of the commodity (Rs/qtl), consumption habit (qtl), totalproduction, Nature of commodity and Requirements for seed/feed/wages as independent variable by using multiple regression model.

Table 4.15: Factors influencing marketed surplus

Variables	Meanvalue	S.D.	'r' value
Mustard			
Size of family (no.)	2.030	0.227	-0.061^{NS}
Size of land holding (ha)	4.621	0.517	0.054^{NS}
Size of area under crops (ha)	4.621	0.517	0.054^{NS}
Price of the commodity (Rs/qtl)	163.061	18.231	-0.309^{**}
Consumption habit (qtl)	1.147	0.128	0.103^{NS}
Total production (qtl)	102.649	11.477	0.714^{**}
Requirements for seed/feed/wages (qtl)	1.310	0.146	0.091^{NS}
(Coefficient of Multiple regression) R	**0.0786**		
Wheat			

Size of family (no.)	2.863	0.320	0.386**
Size of land holding (ha)	3.956	0.442	0.582**
Size of area under crops (ha)	3.956	0.442	0.582**
Price of the commodity (Rs/qtl)	72.717	8.130	0.052NS
Consumption habit (qtl)	3.058	0.342	0.411**
Total production (qtl)	158.978	17.774	0.600**
Requirements for seed/feed/wages (qtl)	5.310	0.594	0.395**
(Coefficient of multiple regression) R	**0.6437**		
Pigeonpea			
Size of family (no.)	3.183	0.356	0.543**
Size of land holding (ha)	2.750	0.308	0.954**
Size of area under crops (ha)	2.750	0.308	0.954**
Price of the commodity (Rs/qtl)	68.413	7.649	0.092NS
Consumption habit (qtl)	0.383	0.043	0.514**
Total production (qtl)	55.146	6.166	1.000**
Requirements for seed/feed/wages (qtl)	0.378	0.042	0.488**
(Coefficient of multiple regression) R	**0.4683**		
Bajra			
Size of family (no.)	2.506	0.280	0.414**
Size of land holding (ha)	3.147	0.352	0.523**
Size of area under crops (ha)	3.147	0.352	0.523**
Price of the commodity (Rs/qtl)	70.117	7.839	-0.005NS
Consumption habit (qtl)	0.525	0.059	0.198NS
Total production (qtl)	31.331	3.503	0.551**
Requirements for seed/feed/wages (qtl)	3.588	0.401	0.345**
(Coefficient of multiple regresion) R	**0.5235**		

NS Non significant, **Significant at 0.01 level of probability

It is observed from the data that the fitted function for mustard was found to be good fit as the coefficient of multiple R value was 7 per cent discovered that the fitted function able to explain more identified independent variable. Amongst all the independent variables i.e. total production were found to be positive and significant. The independent variables like price of the commodity (Rs/qtl) were found to be negative and significant. The independent variables like size of land holding, size of area under crops, consumption habit (qtl) and Requirements for seed/feed/wages were also found non-significant and size of family (no.) were found to be negative and non-significant.

It is observed from the data that the fitted function for wheat was found to be good fit as the coefficient of multiple R value was 64 per cent discovered that the fitted function able to explain more identified independent variable. Amongst all the independent variables i.e. size of family (no.), size of land holding, size of area under crops, consumption habit (qtl), total production and Requirements for seed/feed/wages were also found positive and significant. The price of the commodity (Rs/qtl) were found to be non-significant.

It is observed from the data that the fitted function for pigeonpea was found to be good fit as the coefficient of multiple R value was 46 per cent discovered that the fitted function able to explain more identified independent variable. Amongst all the independent variables like size of family (no.), size of land holding, size of area under crops, consumption habit (qtl), total production and requirements for seed/feed/wages were also found positive and non-significant. The independent variables like price of the commodity (Rs/qtl) were also found non-significant.

It is observed from the data that the fitted function for bajra was found to be good fit as the coefficient of multiple R value was 52 per cent discovered that the fitted function able to explain more identified independent variable. Amongst all the independent variables i.e. size of family (no.), size of land holding, size of area under crops, total production and Requirements for seed/feed/wages were also found positive and significant. The independent variables like consumption habit (qtl) were found to be non-significant and price of the commodity (Rs/qtl) were found to be negative and non-significant.

4.6: Examine the problem faced by farmers in marketing and their suggestion

4.6.1 Problems faced by the farmers in marketing

The detailed study of the major marketing problems faced by the mustard, wheat, pigeonpea and bajra growers in Morena district. The major problems experienced by the various crop growing farmers have been given in table 4.16 with individual rank order. The farmers expressed their views on the basis of marketing problems they received.

The mustard growing farmers stated their problems faced as Price fluctuations (76.25%), Malpractices in the Market (61.25%), High transportation charges (61.25%), Lack of storage facilities (60.00%), Lack of Knowledge about Prices (56.25%), Delay in payment (41.25%), Insufficiency of transportation (40.00%), Improper Grading & Standardization (35.00%), Delay in sale (31.25%) and Lack of Parking Facilities(15.00%).

The wheat growing farmers stated their problems faced as Price fluctuations (81.25%), Lack of storage facilities (72.50%), High transportation charges (66.25%), Insufficiency of transportation (58.75%), Malpractices in the Market (48.75%), Lack of Knowledge about Prices (43.75%), Delay in payment (36.25%), Improper Grading & Standardization (33.75%), Delay in sale (27.50%) and Lack of Parking Facilities (08.75%).

The pigeonpea growing farmers stated their problems faced as Lack of Knowledge about Prices (70.00%), Price fluctuations (61.25%), Lack of storage facilities (61.25%), Malpractices in the Market (61.25%), High transportation charges (61.25%), Insufficiency of transportation (48.75%), Delay in payment (31.25%), Delay in sale (25.00%), Improper Grading & Standardization (22.50%) and Lack of Parking Facilities (22.50%).

The bajra growing farmers stated their problems faced as Lack of Knowledge about Prices (75.00%), Malpractices in the Market (71.25%), Lack of storage facilities (53.75%), Price fluctuations (51.25%), High transportation charges (48.75%), Insufficiency of transportation (45.00%), Lack of Parking Facilities (33.75%), Delay in sale (31.25%), Delay in payment (27.50%) and Improper Grading & Standardization (22.50%).

Overall the Price fluctuations was the top ranked problem stated by maximum number of farmers (67.50%) followed by lack of storage facilities (61.87%), lack of Knowledge about prices (61.25%), malpractices in the market (60.62%), high transportation charges (59.37%), insufficiency of transportation (48.12%), delay in payment (34.06%), delay in sale (28.75%), improper grading & standardization (28.43%) and lack of parking facilities stated by (20%) farmers.

Table 4.16: Problems faced by the farmers in marketing

Particulars	Mustard (n=80)	Rank	Wheat (n=80)	Rank	Pigeonpea (n=80)	Rank	Bajra (n=80)	Rank	Total (n=320)	Rank
Price fluctuations	61 (76.25)	I	65 (81.25)	I	49 (61.25)	II	41 (51.25)	IV	216 (67.50)	I
Lack of storage facilities	48 (60.00)	III	58 (72.50)	II	49 (61.25)	II	43 (53.75)	III	198 (61.87)	II
Lack of Knowledge about Prices	45 (56.25)	IV	35 (43.75)	VI	56 70.00)	I	60 (75.00)	I	196 (61.25)	III
Malpractices in the Market	49 (61.25)	II	39 (48.75)	V	49 (61.25)	II	57 (71.25)	II	194 (60.62)	IV
High transportation charges	49 (61.25)	II	53 (66.25)	III	49 (61.25)	II	39 (48.75)	V	190 (59.37)	V
Insufficiency of transportation	32 (40.00)	VI	47 (58.75)	IV	39 (48.75)	III	36 (45.00)	VI	154 (48.12)	VI
Delay in payment	33 (41.25)	V	29 (36.25)	VII	25 (31.25)	IV	22 (27.50)	IX	109 (34.06)	VII
Delay in sale	25 (31.25)	VIII	22 (27.50)	IX	20 (25.00)	V	25 (31.25)	VIII	92 (28.75)	VIII
Improper Grading & Standardization	28 (35.00)	VII	27 (33.75)	VIII	18 (22.50)	VI	18 (22.50)	X	91 (28.43)	IX
Lack of Parking Facilities	12 (15.00)	IX	07 (08.75)	X	18 (22.50)	VI	27 (33.75)	VII	64 (20.00)	X

4.6.2 Suggestions of farmers for enhancing in marketing

The suggestions from mustard, wheat, pigeonpea and bjara grower farmers were required for enhancing in marketing. An extensive list of suggestions was offered by the farmers. The comprehensive list of the important suggestions, crop wise rank and overall rank has been listed in the Table 4.17.

The mustard growing farmers ranked the suggestions with respect to improvement in Agricultural Marketing Societies (78.75%), Sufficient Transport Facility (63.75%), Bargaining Capacity (63.75%), Loan Facilities (62.50%), Eliminating Middlemen (58.75%), Training facility (48.75%), Market survey (46.25%), Grading and Standardization of Products (40.00%), Use of Standard Weight (38.75%) and Storage Facility (22.50%) (Table 4.17).

The wheat growing farmers ranked the suggestions with respect to improvement in Agricultural Marketing Societies (83.75%), Sufficient Transport Facility (76.25%), Loan Facilities (67.50%), Market survey (65.00%), Bargaining Capacity (51.25%), Eliminating Middlemen (46.25%),

Use of Standard Weight (43.75%), Training facility (42.50%), Grading and Standardization of Products (35.00%) and Storage Facility (21.25%) (Table 4.17).

The pigeonpea growing farmers ranked the suggestions with respect to improvement in Eliminating Middlemen (72.50%), Sufficient Transport Facility (65.00%), Agricultural Marketing Societies (63.75%), Loan Facilities (63.75%), Bargaining Capacity (62.50%), Market survey (56.25%), Training facility (40.00%), Grading and Standardization of Products (33.75%), Use of Standard Weight (27.50%) and Storage Facility (26.25%) (Table 4.17).

The bajra growing farmers ranked the suggestions with respect to improvement in Eliminating Middlemen (77.50%), Bargaining Capacity (72.50%), Sufficient Transport Facility (57.50%), Agricultural Marketing Societies (53.75%), Market survey (51.25%), Loan Facilities (50.00%), Grading and Standardization of Products (41.25%), Storage Facility (38.75%), Training facility (36.25%) and Use of Standard Weight (30.00%) (Table 4.17).

Thus, overall, It was suggested by 70 per cent of the farmers that agricultural marketing societies while taking decisions about marketing. Other important suggestions are; sufficient transport facility (65.62%), eliminating middlemen (63.75%), bargaining capacity (62.50%), loan facilities (60.93%), market survey (54.68%), training facility (41.87%), grading and standardization of products (37.50%), use of standard weight (35%) and storage facility stated by 27.18 per cent farmers.

Table 4.17: Suggestions for enhancing in marketing

Particulars	Mustard (n=80)	Wheat (n=80)	Pigeonpea (n=80)	Bajra (n=80)	Total (n=320)
Agricultural Marketing Societies	63 (78.75) (I)	67 (83.75) (I)	51 (63.75) (III)	43 (53.75) (IV)	224 (70.00) (I)
Sufficient Transport Facility	51 (63.75) (II)	61 (76.25) (II)	52 (65.00) (II)	46 (57.50) (III)	210 (65.62) (II)
Eliminating Middlemen	47 (58.75) (V)	37 (46.25) (VI)	58 (72.50) (I)	62 (77.50) (I)	204 (63.75) (III)
Bargaining Capacity	51	41	50	58	200

	(63.75) (III)	(51.25) (V)	(62.50) (V)	(72.50) (II)	(62.50) (IV)
Loan Facilities	50 (62.50) (IV)	54 (67.50) (III)	51 (63.75) (IV)	40 (50.00) (VI)	195 (60.93) (V)
Market survey	37 (46.25) (VII)	52 (65.00) (IV)	45 (56.25) (VI)	41 (51.25) (V)	175 (54.68) (VI)
Training facility	39 (48.75) (VI)	34 (42.50) (VIII)	32 (40.00) (VII)	29 (36.25) (IX)	134 (41.87) (VII)
Grading and Standardization of Products	32 (40.00) (VIII)	28 (35.00) (IX)	27 (33.75) (VIII)	33 (41.25) (VII)	120 (37.50) (VIII)
Use of Standard Weight	31 (38.75) (IX)	35 (43.75) (VII)	22 (27.50) (IX)	24 (30.00) (X)	112 (35.00) (IX)
Storage Facility	18 (22.50) (X)	17 (21.25) (X)	21 (26.25) (X)	31 (38.75) (VIII)	87 (27.18) (X)

**The values in parenthesis are percentage of total followed by rank*

Chapter-V
DISCUSSION

The previous chapter discussed results of the present study on assessment of marketable and marketed surplus of Major crops in Morena District of Madhya Pradesh. This chapter deals with all possible reasons and explanation to interpret the observed phenomena with the help of findings of the research studies conducted earlier in this field, observations in the field and information collected from other sources.

The chapter is organized in to following sub-headings for convenience and easy interpretation of the results.

5.1 Compound growth rate of area, production and productivity of selected crops in Morena district.

5.2 Estimate the marketable and marketed surplus of selected crops in Morena.

5.3 Estimate farm retention for consumption seed, feed, wages and other payments in kind.

5.4 Examine factor influencing marketable and marketed surpluses.

5.5 Examine the problem faced by farmers in marketing and their suggestion.

5.1. Compound growth rateof area, production and productivity of selected crops in Morena district

The compound growth rates for the study period of 2000-01 to 2017-18 are estimated by fitting the compound function to the area, production and productivity ofselected crops, respectively.

Trend of Area, Production and Productivity of Mustard in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Mustard during the study period (2000-01 to 2017-18) was 140.23 thousand hectares. The compound growth rates evidenced during study period were 0.85 per cent per annum respectively (Table 4.8). The area of Mustard in Morena district of Madhya Pradesh demonstrated a positive

tendency and it was found significant at (1%) level of significance.In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 216.61 thousand tonnes. Compound growth rates were 4.48 per cent per annum respectively. The production of Mustard in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at 1% level of significance.As regards the productivity of Mustard in Morena district of Madhya Pradesh the average productivity during the study period (2000-01 to 2017-18) was 1553.05 kg/hectare. Compound growth rate observed was 3.82 per cent. The productivity growth rates of Mustard in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at 1% level of significance. As a total, the compound growth rate of production of mustard was higher than its area and productivity.

Trend of Area, Production and Productivity of wheat in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Wheat during the study period (2000-01 to 2017-18) was 83.75 thousand hectares. The compound growth rates evidenced during study period were 2.27 per cent per annum respectively (Table 4.9). The area of Wheat in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 266.37 thousand tonnes. Compound growth rates were 5.22 per cent per annum respectively.The production of Wheat in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at 1% level of significance.As regards the productivity of Wheat in Morena district of Madhya Pradesh the average productivity during the study period (2000-01 to 2017-18) was 3132.44 kg/hectare. Compound growth rate observed was 1.78 per cent. The productivity growth rates of Wheat in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at 1% level of significance. As a total, the compound growth rate of production of wheat was higher than its area and productivity.

Trend of Area, Production and Productivity of Pigeonpea in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Pigeonpea during the study period (2000-01 to 2017-18) was 10.04 thousand hectares. The compound growth rates evidenced during study period were 9.47 per cent per annum respectively (Table 4.10). The area of Pigeonpea in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.

In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 16.23 thousand tonnes. Compound growth rates were 17.47 per cent per annum respectively. The production of Pigeonpea in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.As regards the productivity of Pigeonpea in Morena district of Madhya Pradesh the average productivity during the study period (2000-01 to 2017-18) was 1243.66 kg/ha. Compound growth rate observed was 6.67 per cent. The productivity growth rates of Pigeonpea in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at 1% level of significance. As a total, the compound growth rate of production of pigeonpea was higher than its area and productivity.

Trend of Area, Production and Productivity of Bajra in Morena district from 2000-01 to 2017-18

It was found that, in Morena district of Madhya Pradesh average area under Bajra during the study period (2000-01 to 2017-18) was 90.58 thousand hectares. The compound growth rates evidenced during study period were 4.11 per cent per annum respectively (Table 4.11). The area of Bajra in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.

In Morena district of Madhya Pradesh the average production during the study period (2000-01 to 2017-18) was 205.86 thousand tonnes. Compound growth rates were 8.75 per cent per annum respectively. The

production of Bajra in Morena district of Madhya Pradesh demonstrated a positive tendency and it was found significant at (1%) level of significance.

As regards the productivity of Bajra in Morena district of Madhya Pradesh the average productivity during the study period (2000-01 to 2017-18) was 2048.88 kg/hectare. Compound growth rate observed was 4.35 per cent. The productivity growth rates of Bajra in Morena district of Madhya Pradesh demonstrated a positive tendency and it was also significant at 1% level of significance. As a total, the compound growth rate of production of bajra was higher than its area and productivity. Similar result was found by Pilai (2001).

In general, the area under mustard, wheat, pigeon pea and bajra were 140.23, 83.75, 10.04 and 90.58 thousand hectares which contributes average productivity of 1553 kg ha^{-1}, 3132 kg ha^{-1}, 1244 kg ha^{-1} and 2049 kg ha^{-1}, respectively. The average production over the years recorded 217, 266, 16 and 206 thousand tonnes of mustard, wheat, pigeon pea and bajra, respectively during 2000-01 to 2017-18. The compound growth rate in area is found increased in all crops except mustard. The CGR of production and productivity of all crops found increased over the years. The increase in area, production and productivity of crops might be due to the availability of irrigation water, improved seeds, crop intensification, weed control methods, farm mechanization, post-harvest management, market availability etc.DMI (2002) reported that he coverage of the High Yielding Varieties of the order of 77.19 per cent. In total paddy production irrigated paddy and High Yielding Varieties contributed 75.89 per cent and 85.56 per cent, respectively which contributed for increased CGR of production. Chauhan and Kumar (2010) also reported that about (63%) of the total maize cultivated area was under high yielding varieties (HYV) which resulted in increased CGR of production and productivity despite non-significant increase in the area of maize cultivation. Further they also observed that irrigation played an important role in the enhancing maize production and productivity of both local and HYVs. Abid *et al.* (2014) reported that the area, production and yield of maize was increased over the time the reason is that more area was brought under hybrid and improved open pollinated maize varieties. The area under rice crop

has decreased whereas their production increased due the corresponding increase in per hectare yield of rice crop. The area, production and yield of sugarcane crop were found increasing at a rate of 0.24 percent, 0.85 percent and 0.60 percent per annum, respectively. In contrast, Konar and Dey (2018) found that area and production of rapeseed and mustard have recorded negative compound growth rate to the extent of 3.50 and 3.53 percent per annum respectively over a period of 11 years from 1999-2000 to 2010-11. But growth rate of productivity of this crop is noted to be 0.05 percent in the district. Compound growth rate of area, production and productivity of this crop in West Bengal are 0.17, 1.00 and 0.32 percent per annum respectively in same period of time.The results of present investigation are in good agreement with these findings.

Further, the land is the primary fixed input of production constituting the major portion of the fixed cost. The land use patterns on different selected crops are given in Table 4.9. The average land holding of mustard growers is 3.86, wheat growers is 3.71 hectare, pigeonpea growers are 3.07 and bajra growers are 3.1. The average land holding of all four crops was 3.43 hectare. As the study area has good water availability (100%) area was irrigated and there was no barren land as 100% area was under cultivation with adequate irrigation facilities in the form of canal, wells and bore wells which contributed increased production and productivity. The recent studies also reported the increased production and productivity of agricultural crops despite non significant increase in area under cultivation (Singh et al., 2018; Nimbrayan and Bhatiya, 2019; Singh et al., 2020).

5.2. Estimate the marketable and marketed surplus of selected crops in Morena

Marketed surplus

Appreciative the behaviour of marketed surplus and factors influencing it can help in designing sound policies related to agricultural marketing, pricing, buffer stocks, market infrastructure, etc. The marketable surplus of a crop depends on various price and non-price factors such as the accessibility of cultivated land under the crop, family size, income, risk and uncertainties

(Khadase et al., 2001).In order to appreciate the pattern of marketed surplus of mustard, wheat, pigeonpea, bajra and variable influencing it, investigation data collected from four major mustard, wheat, pigeonpea and bajra producing district, namely Morena during from 2000-01 to 2017-18 was used.Information regarding marketed surplus has been analyzed for mustard, wheat, pigeonpea and bajra and show in Table 4.12. Overall, on sample farms the total per farm production of mustard, wheat, pigeonpea and bajra was 6294 quintals, 11603 quintals, 4985 quintals and 2525 quintals, out of which marketed surplus accounted for 2911 quintals, 3536 quintals, 4894 quintals and 1475 quintals, respectively (Table 4.12).

The sale pattern of the crops is presented in Table 4.7. Overall, on sample farms the average per farm production of mustard was 78.66 quintals, out of which marketed surplus accounted for 76.29 quintals. The maximum quantity of mustard was found to be sold in the month of October just after the harvest of the crop. It is also analysis from the data that 52.5 per cent of total marketed surplus had been sold in Mandi and remaining 28.75, 13.75 and 5 per cent proportion of the marketed surplus was sold to corporate society, processor/miller and village traders. While the prices received from Mandi and remaining proportion of the marketed surplus was received to village traders, corporate society and processor. Overall, on sample farms the average per farm production of wheat was 145.03 quintals, out of which marketed surplus accounted for 126.26 quintals. 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 analysis from the data that 97.5 per cent of total marketed surplus had been sold in corporate society and remaining 1.01, 0.88 and 0.62 per cent proportion of the marketed surplus was sold to Mandi, village traders and processor/miller. While the prices received from corporate society and remaining proportion of the marketed surplus was received to Mandi, village traders and processor.Overall, on sample farms the average per farm production of pigeonpea was 62.31 quintals, out of which marketed surplus accounted for 61.16 quintals. The maximum quantity of pigeonpea was found to be sold in the month of March just after the harvest of the crop. It is also analysis from the data that 42.50 per cent of total marketed surplus had been

sold in corporate society and remaining 22.50, 21.25 and 13.75 per cent proportion of the marketed surplus was sold to Mandi, processor/miller and village traders. While the prices received from Mandi and remaining proportion of the marketed surplus was received to corporate society, village traders and processor.Overall, on sample farms the average per farm production of bajra was 31.56 quintals, out of which marketed surplus accounted for 27.43 quintals. The maximum quantity of bajra was found to be sold in the month of September just after the harvest of the crop. It is also analysis from the data that 51.52 per cent of total marketed surplus had been sold in corporate society and remaining 38.75, 8.25 and 1.75 per cent proportion of the marketed surplus was sold to village traders, Mandi and processor/miller. While the prices received from Mandi and remaining proportion of the marketed surplus was received to corporate society, village traders and processor.

Acharya (2004) estimated quantity of marketed surplus of individual agricultural products or product groups and changes there in during fifty years i.e.1950-2000 and found tremendous increase in marketed surplus for rice, wheat, cereals, food grains, oilseeds. The marketed surplus of wheat found increased by 23.4 % (46.4 tonnes for 1999-2000 against 1.9 million tonnes in 1950- 51). The rice and food grains as a whole also showed similar trends. Chauhan and Chhabra (2005) reported marketable surplus of maize comprised of 53.21 per cent of the total production. Alam and Afruz (2010) also reported marketed surplus as percentage of total production was found highest in potato (64 per cent) followed by lentil (59.5 per cent), Boro paddy (57.5 per cent), mustard (52.7 per cent), Aman paddy (48 per cent), Aus paddy (38 per cent) and wheat (14 per cent). In present investigation, the marketed surplus of mustard, wheat and bajra are 46.2%, 30.5% and 58.4% of total production, respectively. The results reported by Alam and Afruz (2010) are in closed agreement with present findings. In contrast, the marketed surplus of vegetables found around 90% of total production. Baba et al. (2010) reported on an average, marketed surplus of vegetablesin Kashmir valley has been found more than 92 per cent of the total production. The marketable and marketed surplus of various crops across the country and

globe reported by Amruta and Darji (2011), Borate *et al*. (2011), Sudhakar et al. (2011), Grover *et al*. (2012), Pandey et al. (2013), Sashimatsung et al. (2013), Kumar et al. (2015), Sharma (2016) and Sahu et al. (2017) also revealed the similar trends. Recently, Balai et al. (2018), Islam (2019) and Yadav et al. (2020) showed the similar results those obtained under present investigation with respect to the marketable and marketed surplus of agricultural produce.

5.3: Estimate farm retention for consumption seed, feed, wages and other payments in kind

Farm retention pattern related to selected crops (mustard, wheat, pigeonpea and bajra) has been analysis and show in table 4.13. The retention consists of quantity kept for family consumption, seed, feed, wages and payments in kind laborers, gifts and others. An average total retention found to retain 26.42 quintal of mustard, wheat, pigeonpea and bajra for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 12.69 quintal was found to be highest followed by family consumption 11.90 quintals and feed 1.83 quintal. There is no wages and payments in kind, respectively.An average mustard grower found to retain 2.37 quintal of mustard for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 1.69 quintal was found to be highest followed by family consumption 0.35 quintal, and feed 0.33 quintal. There is no wages and payments in kind, respectively.An average wheat grower found to retain 18.77 quintal of wheat for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 9.7 quintal was found to be highest followed by family consumption 7.95 quintals and feed 1.12 quintal. There is no wages and payments in kind, respectively.An average pigeonpea grower was found to retain 1.15 quintal of pigeonpea for family consumption, seed, feed, wages and payments in kinds. Out of which the average of family consumption 0.94 quintal was found to be highest followed by seed 0.21quintal. There is no feed, wages and payments in kind, respectively.An average bajra grower was found to retain 4.13 quintal of bajra for family consumption, seed, feed, wages and payments in kinds.

Out of which the average of family consumption 2.66 quintal was found to be highest followed by seed 1.09 quintal and feed 0.38 quintal. There is no wages and payments in kind, respectively.

As mentioned under section marketed and marketable surplus**,** the marketed surplus of mustard, wheat and bajra were 46.2%, 30.5% and 58.4% of total production, respectively indicating the 53.8%, 69.5% and 41.6% retention in the form of family consumption, seed, feed, wages etc. On an average the retention was around 50% of total production of these major crops. Kumar et al. (2014) found that the percentage of total produce retained with farmer was 22.78% of total paddy production. However, in present study the retention percentage is a bit higher. Kaur and Gupta (2017) reported that higher the level of production, lower is the consumption of crop used for retention purpose and higher is the marketed surplus. The improvement in the crop yield increases the level of production which in turn increases the extent of marketed surplus. For all size farm categories, major and significant proportion of gram produce of total retention was for use of feeding animals followed by use for seed requirements of next season. The retentions depend upon the type of crop, land holding, animal population, family size, resource availability etc. Sahu et al. (2017) analyzed the marketable and marketed surpluses of mustard in Morar block of Gwalior district (Madhya Pradesh) and found that the total household requirement under different categories was found to be 120 quintal for large farmers, 104.7 quintal for medium farmers and 18.35 quintal for small farmers. Balai et al. (2018) reported that among the total production of wheat on an average 12.02 quintal (28.10% of total production) was utilized as family requirement to total production.The estimates of retention for various purposes and purchases of paddy to meet the total requirement of farm-family like farm-family consumption, for consumption by permanent and temporary labour, estimated purchases for consumption, for seed purpose, for animal feed and for payment in cash and kind were worked out at 26.08, 2.22, 5.38, 1.80, 0.18 and 1.54 per cent, respectively (DMI, 2002).Sudhakar et al. (2011) reported marketed surplus of rice found lower than marketable surplus in all the categories of households because farmers prefer to keep part of rice production for consumption

purpose and like to keep more quantity as there is no guarantee of good harvest in the next season.Singh *et al*. (2011) estimated the extent and pattern of marketed surplus and home utilization of wheat on farm households in Punjab. The analysis revealed that 7.69, 3.17, 2.41, and 2.28 per cent of the total wheat output was utilized at home as food, animal feed, seed and kind payments, respectively.Grover *et al*. (2012) reported the retention pattern of rice as home consumption, payment in kind, feed and seed accounted for 0.24, 0.22, 0.09 and 0.08 per cent of paddy production, respectively and that for wheat was home consumption, seed, feed and payments in kind accounted for 6.26, 1.52, 1.61 and 0.14 per cent of wheat production, respectively. The results of Prusty and Tripathy (2015), Sharma et al. (2016), Sahu et al. (2017), Balai et al. (2018) and Yadav et al. (2020) are in good agreement with the findings of present study.

5.4: Examine factor influencing marketable and marketed surpluses

Factors influencing Marketed Surplus

The predictable regression parameters of the marketed surplus model are shown in Table 4.13. As estimated, variables like size of family (no.), size of land holding, size of area under crops, price of the commodity (Rs/qtl), consumption habit (qtl), total production, Nature of commodity and Requirements for seed/feed/wages as independent variable by using multiple regression model.It is analysis from the data that the fitted function for mustard was found to be good fit as the coefficient of multiple R value was 7 per cent discovered that the fitted function able to explain more identified independent variable. Amongst all the independent variables i.e. total production were found to be positive and significant. The independent variables like price of the commodity (Rs/qtl) were found to be negative and significant. The independent variables like size of land holding, size of area under crops, consumption habit (qtl) and Requirements for seed/feed/wages were also found non-significant and size of family (no.) were found to be negative and non-significant. It is analysis from the data that the fitted function for wheat was found to be good fit as the coefficient of multiple R value was 64 per cent discovered that the fitted function able to explain more identified

independent variable. Amongst all the independent variables i.e. size of family (no.), size of land holding, size of area under crops, consumption habit (qtl), total production and Requirements for seed/feed/wages were also found positive and significant. The price of the commodity (Rs/qtl) were found to be non significant.It is analysis from the data that the fitted function for pigeonpea was found to be good fit as the coefficient of multiple R value was 46 per cent discovered that the fitted function able to explain more identified independent variable. Amongst all the independent variables like size of family (no.), size of land holding, size of area under crops, consumption habit (qtl), total production and requirements for seed/feed/wages were also found positive and non-significant. The independent variables like price of the commodity (Rs/qtl) were also found non-significant.It is analysis from the data that the fitted function for bajra was found to be good fit as the coefficient of multiple R value was 52 per cent discovered that the fitted function able to explain more identified independent variable. Amongst all the independent variables i.e. size of family (no.), size of land holding, size of area under crops, total production and Requirements for seed/feed/wages were also found positive and significant. The independent variables like consumption habit (qtl) were found to be non significant and price of the commodity (Rs/qtl) were found to be negative and non significant.

Factors influencing marketable surplus

Factors influencing marketable surplusrelated to selected crops (mustard, wheat, pigeonpea and bajra) has been analysis and show in table 4.15. Marketable surplus is total requirement of the farmers. It is analysis from the data that the maximum average total production 317.56 quintal, family consumption 11.90 quintals, seed 12.69 quintals, feed 1.83 quintals, total requirement 26.42 quintals and no wages. It is evaluated from the data that marketed surplus of mustard, wheat and bajra was found to be less than marketable surplus in different crops. Marketed surplus of pigeonpea was found to be more than marketable surplus. Marketable surplus of mustard, wheat, pigeonpea and bajra was initiate to be maximum in wheat 126.26 quintals followed by mustard 76.29 quintals, pigeonpea 61.16 quintals and bajra 27.43 quintals. Marketed surplus of mustard, wheat, pigeonpea and

bajra was initiate to be maximum in pigeonpea 61.17 quintals followed by wheat 44.19 quintals, mustard 36.38 quintals and bajra 18.43 quintals.

In present investigation, the price of the commodity and total production influenced the marketed surplus of mustard. In contrast, except price of the commodity all factors viz., family size, land holding, cropped area, consumption and production influenced the marketed surplus of wheat. The pigeon pea followed the similar trend which observed for wheat crop. The bajra also found the similar trend except consumption habit which found non significant factor for marketed surplus (Table 4.15). The factors governing marketable surplus and marketed surplus are size of holdings, retentions for in-kind payment, home consumption and production (Khadase et al., 2001). Total marketed and marketable surplus had a positive relationship with the size of holdings, while retentions for in-kind payment and home consumption had a negative relationship with the size of holdings. Rahji (2002) found age of the household head, farm size, hired labour, distance to market, access to motor vehicle transport, and ownership of livestock as significant factors influencing marketable and marketed surplus. Barman (2003) found farm size, rice-growing area and intensity of rice cultivation had a significant and positive influence on marketed surplus.Pouchepparadjou and Sendhil (2006) reported that the farm size, rice output, wages in kind, and a dummy variable for education were found to have positively contributed to the marketed surplus.Kumar (2007) observed that themarketed output was found to be having a direct relation with the size of land holding.Verma *et al.* (2009) indicated that lower holding size created hampered wheat production among the crops in particular. Size of net operated area, volume of production and number of adults units in the farm family was influenced by the volume of marketed surplus. An ever increase in population increases the demand of produce on one hand and on the other it's also reduces the size of holdings through consistent fragmentation. The findings of Usha (2013), Bizualem et al. (2015), Subhash (2016), Deogharia (2017), Pawariya et al. (2020) and Mithibutu et al. (2021) also explored more or less similar factors influencing the marketable and marketed surplus of agricultural produce.

5.5: Examine the problem faced by farmers in marketing and their suggestion

Revealed that major problems experienced by the farmers Price fluctuations (Rank-I) followed by lack of storage facilities (Rank-II), lack of Knowledge about prices (Rank-III), malpractices in the market (Rank-IV), high transportation charges (Rank-V), insufficiency of transportation (Rank-VI), delay in payment (Rank-VII), delay in sale (Rank-VIII), improper grading & standardization (Rank-IX) and lack of parking facilities (Rank-X) (Table 4.16).The Suggestions were required from farmers for enhancing in marketing. An extensive list of suggestions was offered by the farmers such as agricultural marketing societies while taking decisions about marketing with rank first followed by sufficient transport facility, eliminating middlemen, bargaining capacity, loan facilities, market survey, training facility, grading and standardization of products, use of standard weight and storage facility by way of rank II, III, IV, V, VI, VII, VIII, IX and X respectively (Table 4.17).

The storage of soybean is one of the major problems faced by farmers. The soybean contents about 20-22 per cent oil and highly susceptible to shattering losses, spoilage grain in pods due to occasional rains received during the harvesting period and losses due to impact damage require more careful handling during harvesting and threshing operations to avoid stress, cracks, splits and breakage of kernels (Anonymous, 2007). Patel (2009) reported that majority of the soybean growers (90%) reported that shortage of power supply is the main constraints followed by Lack of skill labour at the time of harvesting and winnowing period and lack of storage facilities got (rank IInd) in important constraints respectively. The next important constraints was unfavorable weather condition at the time of harvesting (rank IIIrd) followed by Shortage of labour at time of harvesting and Lack of all weather roads (rank IVth), Detonation in quality of grains when combiner is used (rank Vth), Lack of technical knowledge and Lack of capital (rank VIth), Unavailability of machine at the time of harvesting and Unavailability of machine at the time of threshing and winnowing (rank VIIth), Lack of knowledge about warehouse and Lack of suitable site/floor for drying (rank VIIIth) respectively. Chauhan and Kumar (2010) concluded that inadequate

storage facilities at farmers level and occurrence of the post harvest losses by insect pests attack during storage is the major problem faced by farmers with respect to maize crop. Mechan (2011) observed that lack of knowledge about recommended post harvest technology and lack of knowledge about recommended practices are major issues with farmers which influenced the production, marketed and marketable surplus. The struggle of farmers with respect to price fluctuations, lack of storage facilities, lack of knowledge, malpractice in the market, lack and expensive transportation facilities, delay in sale and payment, lack of parking facilities etc. was well documented by Maske *et al*. (2012), Onyenobi *et al* (2014), Pallewar *et al.* (2014), Sharma and Rathi (2014), Ghule et al. (2014), Kashish et al. (2014), Patel and Pundir (2016), Sahu et al. (2017), Jeyaramya (2020) and Sundaramoorthy and Abirami (2021).

Chapter - VI

SUMMARY, CONCLUSION AND SUGGESTIONS

6.1 Summary:

The current study entitled, “Assessment of marketable and marketed surplus of Major crops in Morena District of Madhya Pradesh" was conducted with the following objectives:

Specific objectives

1. Compound growth rate of area, production and productivity of selected crops in Morena district.
2. Estimate the marketable and marketed surplus of selected crops in Morena.
3. Estimate farm retention for consumption seed, feed, wages and other payments in kind.
4. Factor influencing marketable and marketed surpluses.
5. Problem faced by farmers in marketing and their suggestion.

To get good economic results both production and marketing are important. A poor production or a poor marketing procedure will definitely reduce the monetary return. In view of the predominant position of Agricultural sector, collection, maintenance of Agricultural Marketed and Marketable Surplus of food grains assume great importance. The marketed surplus is, hence, as vital as total production in influencing market prices. 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 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. 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.

The present study was conducted in Morena district of Madhya Pradesh. The multistage sampling technique was used to draw the sample for the present study. Four blocks was selected because of highest production of Mustard in Morena block, Wheat in Porsa block, Pigeonpea in Jaura block and Bajra in Ambah block. The proportionate random sampling was used to draw 320 farmers (80 Mustard growers, 80 Wheat growers, 80 Peogenpea and 80 Bajra growers) were selected crops from 5 villages from each block were selected randomly (total 20 villages).

The compound growth rates for the study period of 2000-01 to 2017-18 were predictable by fitting the compound function to the compound growth rates of 0.85, 2.27, 9.47 and 4.11 per cent, respectively for area and for the production it was 4.48, 5.22, 17.47 and 8.75 per cent, respectively. However, the productivity of Mustard revealed a positive trend with the compound growth rates of 3.82, 1.78, 6.67 and 4.35 percent, respectively. Among the area, production and productivity in Morena district of Madhya Pradesh, the production revealed higher growth rates with an increasing trend due to increased trend in growth rates of area and productivity.

Farm retention pattern related to selected crops (mustard, wheat, pigeonpea and bajra) has been analysis. The retention consists of quantity kept for average total retention found to retain 26.42 quintal of mustard, wheat, pigeonpea and bajra for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 12.69 quintal was found to be highest followed by family consumption 11.90 quintals and feed 1.83 quintal. There is no wages and payments in kind, respectively.

Factors influencing marketable surplusrelated to selected crops (mustard, wheat, pigeonpea and bajra) has been analysis. Marketable surplus is total requirement of the farmers. It is evaluated from the data that marketed surplus of mustard, wheat and bajra was found to be less than marketable surplus in different crops. Marketed surplus of pigeonpea was found to be more than marketable surplus. Marketable surplus of mustard, wheat, pigeonpea and bajra was initiate to be maximum in wheat 126.26 followed by

mustard 76.29, pigeonpea 61.16 and bajra 27.43. Marketed surplus of mustard, wheat, pigeonpea and bajra was initiate to be maximum in pigeonpea 61.17 followed by wheat 44.19, mustard 36.38 and bajra 18.43.

Major problems faced by the Mustard, Wheat, Pigeonpea and Bajra growers during the marketing of selected crops was Price fluctuations, lack of storage facilities, lack of Knowledge about prices, malpractices in the market, high transportation charges, insufficiency of transportation, delay in payment, delay in sale, improper grading & standardization and lack of parking facilities.

6.2 Conclusions:

From the above summary of result enabled confirmation of the hypotheses and to draw precise conclusion.

The compound growth rates for the study period of 2000-01 to 2017-18 were predictable by fitting the compound function to the compound growth rates for the area, production and productivity in Morena district of Madhya Pradesh, the production revealed higher growth rates with an increasing trend due to increased trend in growth rates of area and productivity.

Marketed surplus of wheat, mustard and bajra was found to be less than marketable surplus in different crops. Marketed surplus of pigeonpea was found to be more than marketable surplus.

An average total retention found to retain 26.42 quintal of wheat, mustard, pigeonpea and bajra for family consumption, seed, feed, wages and payments in kinds. Out of which the average of seed 12.69 quintal was found to be highest followed by family consumption 11.90 quintals and feed 1.83 quintal. There is no wages and payments in kind, respectively.

Thus this study concludes by portraying the economic condition of Mustard, Wheat, Pigeonpea and Bajra growers in the Morena, Porsa, Jaura and Ambah blocks of Morena district. This study also dealt with problem faced by farmers so these suggestions can help the future researches and the agricultural marketing.

6.3 Suggestions:

These are suggestions which will help the Mustard, Wheat, Pigeonpea and Bajra growers in the study area to recover the prevailing situation of production and agricultural marketing of Mustard, Wheat, Pigeonpea and Bajra.

- The farmers can aim international exports which can yield more profit.
- Co-operative marketing can help small and medium farmers to reduce their Marketing cost.
- Grading and sorting at field level will give good price for the commodity.
- Co-operative storage facilities will reduce distress sale and can save the farmers from price fluctuations.
- Newspaper, radios and televisions are good sources of marketing information; the farmers have to make it a habit of using these media to get timely market information.
- The farmer suggested that agricultural marketing societies while taking decisions about marketing.
- Sufficient quantity of better seeds must be made accessible timely to increase marketable surplus by increasing productivity.

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Interview schedule for Ph.D. Thesis

Name of Guide Name of investigator

Dr. A. M. JaulkarKiran Sharma

APPENDICES

Title of the ResearchProblem: **"Assessment of marketable and marketed surplus of major crops in Morena district of Madhya Pradesh"**

PART – A

1.General information of the respondent:

Name of farmer: ……

Father's name: …….

Age: ……

Education: …….

Village: ……..

Block: ……..

Category: ……

Main Crop: ……..

2.Land and land use pattern:

Total land holding (hac.)	Cultivated area (hac.)	Uncultivated area (hac.)	Irrigated area (hac.)	Unirrigated area (hac.)

3.Information regarding different crops

Crops	Size

4.Other source of income:

Characteristics Categories	
Dairy	
Poultry	
Fisheries	
Service	
Farm labour	
Others	
Family Size (no.)	
Males	
Females	
Children	

5.Source of Irrigation (Crop Wise and Source Wise Distribution of Irrigated Area in Different Size Classes) % Area under Irrigation

Sources					
Canal					
Electric tube-wells					
Bore wells					
Others					

6.Farm Size and Livestock

Livestock	Cattle	Buffalo	Others

7.Sale Price (Rs/qtl) Received for Different Crops

Crops		
Mustard		

*For marginal category Rs.3000/qtl

8.Sale Pattern and Realized Price of Selected Crops

Crops	Sale in qtl	Percentage of sales				Avg. price received by farmer			
		Village trader	Mandi	Processor/ Miller	Corporate society	Village trader	Mandi	Processor/ Miller	Corporate society
Mustard									

9.Crops Retention Pattern

Crops	Family consumption	Seed	Feed (Cattle)	Wages
Mustard				

10.Factor affecting marketable surplus

Total Production	Requirement					Total Requirement	Marketable Surplus (TP-TR)	Marketed Surplus
	Family consumption	Seed	Feed	wages	Other			

11. Table 7: Factor affecting marketed surplus

Crops	Size of family (No. of family members)	Size of land holding	Size of area under crops	Price	Consumption habit	Total production	Nature of commodity	Requirements for seed/ feed/ wages
Mustard								

12. Information regarding marketed surplus

Total production	How much sale	At which price	How much store

PART – B

Problems faced by the farmers in marketing

1. ……
2. .....
3. .....
4. .....

Suggestions of farmers for enhancing in marketing

1. ……
2. .....
3. .....
4. .....

VITAE

Name of the author	**:**	**Kiran Sharma**
Father's name	**:**	**Brijkishore Sharma**
Date of birth	**:**	**10th September, 1992**
Address	**:**	**Gram Sirmiti, Nawali Badagaon, Morena (M.P.)**

Academic qualifications:

CLASS	YEAR	BOARD/ UNIVERSITY	SUBJECTS	%
Ph.D. (Ag.)	Pursuing	RVSKVV, GWALIOR	Agricultural Economics	74.00
M.Sc. (Ag.)	2017	MGCGV, Satna (M.P.)	Agricultural Economics	80.00
B.Sc. (Ag.)	2015	MGCGV, Satna (M.P.)	Agriculture	74.00
Higher Secondary	2010	M. P. Board Bhopal	PCB	60.00
High School	2008	M. P. Board Bhopal	All subjects	66.00

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