

**Farm profitability, resource use efficiency and production
constraints of cotton cultivation in Barwani district of
Madhya Pradesh**



THESIS

Submitted to the

Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior

**In partial fulfillment of the requirements for
the degree of**

MASTER OF SCIENCE

In

AGRICULTURE

(AGRICULTURAL ECONOMICS AND FARM MANAGEMENT)

By

RANJEET DAWAR

**Department of Agricultural Economics and Farm Management
Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior**

R.A.K.College of Agriculture

Sehore 466001 (M.P.)

2012

CERTIFICATE - I

*This is to certify that the thesis entitled “FARM PROFITABILITY, RESOURCE USE EFFICIENCY AND PRODUCTION CONSTRAINTS OF COTTON CULTIVATION IN BARWANI DISTRICT OF MADHYA PRADESH” submitted in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE in AGRICULTURE** (Agril. Economics and Farm Management) of **RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, GWALIOR** is a record of bonafide research work carried out b **Mr. Ranjeet Dawar**, I.D.No.RA/SH/371/2006, under my guidance and supervision. The subject of the thesis has been approved by the Student’s Advisory Committee and the Director of Instruction.*

No part of the thesis has been submitted for any other degree or diploma (Certificate awarded etc.) or has been published/ published part has been fully acknowledged. All the assistance and help received during the course of the investigations have been acknowledged by him.

Place - Sehore

(Dr.P.K.Malviya)

Date -

Chairman of the Advisory Committee

THESIS APPROVED BY THE STUDENT’S ADVISORY COMMITTEE

Chairman	-	Dr. P.K.Malviya
Member	-	Dr. P.S.Raghuwanshi
Member	-	Dr.(Smt.)S.B.Tambi

CERTIFICATE - II

This is to certify that the thesis entitled “FARM PROFITABILITY, RESOURCE USE EFFICIENCY AND PRODUCTION CONSTRAINTS OF COTTON CULTIVATION IN BARWANI DISTRICT OF MADHYA PRADESH” submitted by Mr. Ranjeet Dawar, I.D.No. RA/SH/371/2006, to the Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior, in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE in AGRICULTURE in Department of Agril. Economics and Farm Management., R.A.K.College of Agriculture, Sehore has been, after evaluation, approved by the External Examiner and by the Student’s Advisory Committee after an oral examination of the same.

Place - Sehore

(Dr.P.K.Malviya)

Date -

Chairman of the Advisory Committee

MEMBERS OF THE ADVISORY COMMITTEE

Major advisor

.....

Head of section / department

.....

Dean

.....

Director of Instruction

.....

ACKNOWLEDGEMENT

I take it to be my proud privilege to avail this opportunity to express my sincere and deep sense of gratitude chairman of my advisory committee **Dr.P.K.Malviya**, Professor (Agril. Economics) R.A.K.College of Agriculture, Sehore, for his stimulating guidance, constructive suggestions, keen and sustained interest and incessant encouragement bestowed during the entire period of investigation, as well as critically going through the manuscript.

I am gratified to record sincere thanks to the members of the advisory committee, Dr.P.S.Raghuwanshi (Prof.) Department of Agril. Economics & Farm management, Dr.(Smt.) S.B.Tambi (Prof.& Head) Department of Agril. Extension, R.A.K.College of Agriculture, Sehore for their generous gestures and valuable suggestions in planning and execution of this study.

I am privileged to express sincere and deep sense of gratitude to Dr.V.S.Gautam, Dean, R.A.K.College of Agriculture, Sehore for his due attention and encouragement during the study period and also for providing me the necessary facilities during the course of study.

I am deeply obliged and indebted to Dr S.N.Soni (Professor and Head of Section) Department of Agril. Economics & Farm management, R.A.K. College of Agriculture, Sehore for his unique help and fruitful direction for the success of this study.

I feel delighted to acknowledge my friend and fellow Sanjay Dawar, Sumit Chourey, Arvind Jharkhande, Ravindra Dawar, Jitendra Dawar, Yogesh Yadev for their everlasting help and encouragement during the course of investigation.

I feel short of words to express my gratitude to my parents Shree Kalu Dawar and Smt. Sava Bai Dawar, and Brother Lakhon Dawar and my sister Devaki Dawar for their utmost co-operation, love and encouragement during the course of this work.

Place – Sehore

Date -

(Ranjeet Dawar)

CONTENTS

S.NO.	TITLE	PAGES
1	INTRODUCTION	1-4
2	REVIEW OF LITERATURE	5-10
3	MATERIAL AND METHODS	11-17
4	RESULTS	18-29
5	DISCUSSION	30-32
6	SUMMARY, CONCLUSION AND SUGGESTIONS	33-38
7.	BIBLIOGRAPHY	39-40
	APPENDIX	i-v
	VITA	

LIST OF TABLE

TABLE NO.	TABLE	PAGE NO.
4.1	Age and education levels of sample farmer	18
4.2	Average strength of the sample family	19
4.3	Distribution of family member as work force	19
4.4	Land use pattern and level of irrigation on sample farm	20
4.5	Value of the total farm assets on sample farms	21
4.6	Input utilization and level of yield in cotton cultivation	22
4.7	Cost of cultivation of cotton on sample holding	23
4.8	Profitability of cotton crop	24
4.9	Production function coefficient of cotton crop on the sample farm	24
4.10	Optimum level of input utilization in cultivation of cotton	25
4.11	Production constraints identified by the sample farmers	27
4.12	Suggestions confronted by the sample farmers	28

LIST OF Figure

TABLE NO.	TABLE	PAGE NO.
1	Age and education levels of sample farmer	18-19
2	Average strength of the sample family	19-20
3	Distribution of family member as work force	19-20

CHAPTER - I INTRODUCTION

Cotton is the most important fiber crop playing a key role in economic and social affairs of the world. It is the oldest among the commercial crop of the world. Cotton is cultivated in India from sub Himalayan region of Punjab in the north to Kerala to south and from dry regions of Kutch to high rainfall areas of Manipur in east. Among the all cotton growing countries, India occupies the foremost position in cotton acreage. It is grown in nearly 8 million hectares, which is almost 25 per cent of the world cotton acreage, but production is only 9 per cent of the total world seed cotton output.

Presently as estimated sixty million people depend for their livelihood on its cultivation, marketing, processing export etc. the textile industries based on this raw material have a weightage average of almost 20 per cent in the entire industrial output of the country (Narayanan and Singh 2009). The steady growth of the organized cotton spinning industry paved the way for phenomenal expansion of decentralized weaving sector consisting of handloom and power looms especially in the rural and semi urban areas. The organized textile industry in India is the second biggest in the world with a capacity of 26.7 million spindles, 70,000 rotors and 0.178 million looms. It provides direct employment to about 1.2 million workers. Above all, the exports of raw cotton, cotton yard and textile manufactures including garments and by products of cotton seed fetch about Rs.60,000 million foreign exchange for the country. This is the largest amount for any sector that contributes to as much as one fourth of the countries total exchange earnings.

In Madhya Pradesh, cotton is grown in about 6.00 lakh hectares with an annual production of 4.00 lakh bales (180 kg/ bale) in 2009-10. In M.P., East Nimarh and West Nimarh are the major area where cotton is grown. The important cotton growing district are Khargone (40.04% and production 39.12%), Khandwa (26.68% and production 17.04%), Dhar (13.97% and production 16.60%) and Barwani (7.18% and production 6.99%) in 2009-10. In Barwani district, the area under cotton is about 58 thousand hectare with production of 29.8 thousand tonnes and productivity was 515 Kg/hectare in the year of (2009-10).

It is felt known that a basic need of Indian agriculture is an increase in the productivity of different crops with optimal use of production resources. The main contributory factors that influence the productivity found to technological and resource use status of farm and adoption of improved agronomical and farm practices etc. These factors have to be viewed in any efforts designed to increase production. Madhya Pradesh is also one of the front runners that benefited from the improved production agricultural technologies, because of its rich resource endowments and suitable agro climatic condition for various crop production processes. It took lead in adoption of the yield increasing technologies, as a result of spread of the technology the production of agriculture increased in year to year particularly in respect of commercial crop production.

Commercial crop like cotton has been recognized as highly remunerative crop, which provides avenues for diversification, enhanced returns per unit area, better land and water used with opportunities for employment generation. Cotton provide ample opportunities to farmers to adopted multi layer cropping for minimizing risk of crop failure, maximizing their farm income. The new farming strategy calls for the adoption of balanced and efficient use of modern inputs for profitable and increase in production. The use of modern technology needs a careful management of resources before allocating the area under any crop. Farmers should well aware with different types of costs incurred and return obtained from particular crop, for minimizing the risk factor and easily adoption of modern technology of particular crop. If farmers will have such valuable information then they can allocate a manageable area under particular crop and can also achieve a desirable benefit.

On the other hand, the problem is arising that the pattern of cotton production has been changing over time in different regions. The shifts in preference of domestic consumers, increasing urbanization, rising incomes, demographic and social factors and the changes in productivity of cotton have brought about changes in the pattern of consumption and hence, the demand for cotton. The production pattern of cotton also affected due to use of resource pattern, level of production technology and price factor of input and output respectively. It has been found in various studies that the yield of cotton is directly influencing with level of technology used in production, or we can say that the influence of technology development in cotton production and its adoption is augmenting regarding total production and

productivity of cotton is being recognized. However, wide gap prevails between the performance of technology at the progressive farmer's level and of the fields of general farmers. The constraint operating due to modern cotton production technology are more of capital intensive and the farmers have to invest more on yield attributing inputs like seed, fertilizers, plant protection measures and irrigation etc. Due to high cost of inputs and ignorance about improved practices general farmers found to not judicious application of improved technology. In this respect question arising that "are investment on modern technology was proportionately enhanced the output and net return? needs investigation and verification in respective of cotton growing area. The Barwani district of Madhya Pradesh is one of the important cotton growing area hence, selected for study.

The main purpose of this study is to evaluate the efficiency with which the farmers in Barwani use their resource in the cultivation of cotton crop and resultant more economic returns against general crop production. The result of profitability and resource use efficiency in cotton production with different level use of production technology will indicate the scope existed to increase there area, production and productivity also with judicious use of scares and important inputs. This may also help in turn-out negative return in to positive by over come the inefficient use of different inputs used in the cultivation of different crops. The specific objectives of the study are as follow:

Objectives of the study:

1. To study the economic characteristics of selected farmers.
2. To study the economic of cotton.
3. To examine the resource productivity and use efficiency.
4. To identify the problems in cotton production.
5. To suggest the ways and means for increasing the cotton production on the bases of existing results.

Limitation of the study:

- (a) In this study only those factors are considered which are under the control of the respondents and contributes significantly toward returns and use of resources in cotton production.

- (b) The coverage of study is limited to area of Barwani district only comprising of limited respondents. This is due to the fact that coverage of large area is beyond the capacity of investigator.
- (c) The primary data collected for the study were entirely based on memory of the cultivators because cultivators do not keep any records regarding their farm practices.
- (d) The data are pertaining to the agriculture year 2011-12.

CHAPTER- II

REVIEW OF LITERATURE

- (e) The necessity of the review of literature for the research worker is to assess what work (both theoretical and empirical) has so far been done in the field of present study, because it provides a basis to understand the problem and help in the proper investigation. In the view, the attempt has been made to review the work done in the field of “economics and resource use efficiency of cotton”. There are some of the important and relevant studies done so far as reviewed below:
- (f) Economics of production:**
- (g) Ramamoorthy (1990) reported that the farmers are highly price responsive. Therefore, a stable cotton price policy holds the key for cotton production and productivity. In order to increase the profitability of the cotton-crops, steps may be taken to reduce the cost of production by increasing the yield. The efficiency of vital input like seed, fertilizer and pesticides may be improved as to reduce the cost through increased yield. The overall average yield per hectare was 8.18 quintals and cost of production rupees per hectare and cost of production rupees per quintals of seed cotton in India were Rs.6,100 and Rs. 753 respectively in 1986-87. Low income discourages the use of modern production technologies and act as disincentive to produce more.
- (h) Basu *et.al.* (1992) reported that the cotton is a labour intensive crop. Risks are high in rainfed cotton from unfavorable rainfall distribution and drought and input use related to field increase influenced by weather factors. Cotton crops are affected serious from pests and diseases, which cause 20-30 per cent loss annually. They also revealed that seed cost of hybrid cotton's is high. Rainfed cotton yield are far lower compared to irrigate. Average plant protection costs on total cultivation charges is estimated at 25-40 per cent in irrigated crop and about 10-15 per cent in rainfed cotton depending on pests incidence, management strategies, input cost and cotton prices.

Study also revealed that sustainability of production, requisite quality standards and rising cost of cultivation, pest management and environmental implications, defective irrigation practices, unstable production and widespread complains on deterioration of fiber quality are some of the serious challenges for the scientist, developmental staff, field functionaries and the cotton growers to achieve this, scientists worldwide are working to meet serious scientific challenges.

- (i) Reddy (1997) a study was conducted in Guntur District Andhra Pradesh, India to investigate yield gaps and the economics of cotton cultivation on small, medium and large farmers and 126 sample farms for the agricultural year 1993-94. The findings indicate that: (1) Farm size was positively related to total costs and net returns; (2) The yield gap between the research station farms and sample farms was the highest, followed by the yield gap between demonstration farms and sample farms and research station farms and demonstration farm and these were also related to farm size” (3) large farmers have benefited more from the adoption of technological innovation than small and medium farmers; (4) the major factors contributing to yield gap were the gap in the use of nitrogen, phosphorus, human labour, bullock labour and seeds, and excessive use of pesticides; and (5) the major constraints for exploitation of yield potential were identified as lack of technical guidance, pest incidence, lack of owned capital, high cost of inputs and non-remunerative, lack of owned capital, high cost of inputs and non-remunerative prices. The results imply that the yield on actual farms could be increased by 50 per cent over its existing level (12Q/ha) by supplying key inputs at subsidized rates, providing technical guidance’s and institutional credit at reasonable interest rates, making available irrigation water based on regional crop planning

remunerative output pricing, and streamlining the existing extension system for effective transfer of technology. These strategies could also reduce income inequalities among the various size groups of farms.

- (j) Beyers *et.al.* (2002) observed that average yield per hectare of seed was higher for adopters than for non-adopters. Bt. adopters suffered far less of a fall in yields than those who did not adopt. As yields and gross margins are partial measures of efficiency, deterministic and stochastic efficiency frontiers were measured. Both methods confirm the farm accounting results, showing that Bt.cotton adopters were more efficient.
- (k) Ismael *et.al.* (2002) revealed that average yield per hectare of seed was higher for adopters than for non-adopters of Bt.cotton. The increase in yields and reduction in chemical application costs outweighed the higher seed cost, so that gross margins were also considerably higher for adopters. The farm accounting results, showing that the Bt.cotton adopters were considerably more efficient than those who used the non-Bt varieties.
- (l) Ismael *et.al.* (2002) suggested that Bt.cotton had higher yields than non-Bt varieties and generated greater revenue. Seed costs for Bt.cotton were double those of non-Bt, although pesticide costs were lower. On balance, the gross margins (revenue minus costs) of Bt growers were higher than those of non-Bt growers.
- (m) Pray *et.al.* (2002) revealed that over 4 million smallholders have been able to increase yield per hectare, and reduce pesticide costs, time spent spraying dangerous pesticides, and illnesses due to pesticide poisoning. Returns are high for adopters of Bt.cotton to make substantial gains in net income. The study also depicted that Bt. Cotton varieties are becoming a very important part of the cotton industry. Understanding this technology and knowing the management practices could increase both profit and

- yields.
- (n) Yousouf *et.al.* (2002) explored the economic benefits of the adoption of *Bacillus thuringiensis* (Bt) cotton for smallholder farmers in the Republic of South Africa. The study found reason for cautious optimism in that the Bt variety generally resulted in a per hectare increase in yields and value of output with a reduction in pesticide costs. They suggest that Bt.cotton is good for smallholder cotton farmers and the environment.
 - (o) Gouse *et.al.* (2003) stated that both i.e. large and small scale farmers enjoy financial benefits due to higher yields and despite higher seed costs. In addition, those who adopted the technology appear to be more technically efficient than those who do not adopt, indicating that it is perhaps the better farmers who spot the potential benefits of the Bt cotton seed.
 - (p) Bennett *et.al.* (2003) revealed that in the process of Bt. Cotton production, cost savings emerged in the form of lower requirements for pesticide, but also important were reduced requirements for water and labour. The increasing adoption rate of Bt.cotton appears to have a health benefit measured in terms of reported rates of accidental insecticide poisoning. Bt.cotton growers emerge as more resilient in absorbing price fluctuations.
 - (q) Bennett *et.al.* (2004) reported substantial and significant financial benefits to smallholder cotton growers of adopting Bt.cotton in terms of increased yields, lower insecticide spray costs and higher gross margins.
 - (r) Palvi (2006) reported that the overall profitability (input output ratio) of Bt-cotton obtained on the three categories of farm, large farms were observed to be more profitable because of their most favourable input output ratio, at

1:1.87 small farms received lowest profit and could achieve the input output ratio of only 1:1.74 among the two varieties (Rasi-2 and mahyco-162) of Bt-cotton Rasi-2 was found to be most profitable when compared with the Mahyco-162 varieties .The overall profitability for Rasi-2 and Mahyco-162 was estimated,1:1.80 and 1:1.65 respectively.

- (s) Visawadia *et.al.* (2006) revealed that the total cost per hectare is higher in Bt.cotton than hybrid cotton. The cost of seed has been found higher in Bt.cotton whereas hybrid cotton growers incur more cost on insecticides/pesticides. This shows the effectiveness of the new technology (Bt.cotton) for insect resistance. The average total costs of production as well as the bulk line cost have been found lower in Bt.cotton. This depicts a reduction in the unit of cost of Bt.cotton, which is the distinct advantage of the new technology. A higher yield of 29 per cent has been obtained by the Bt.cotton farmers over the hybrid cotton growers. The study has identified the constraints in production, and marketing of Bt.cotton in the area. Bt.cotton has been found a superior technology to hybrid cotton, as it gives higher yield and has low cost of production.
- (t) Allawa (2008) reported that the study shows that cost A1, the average cost of Bt.cotton cultivation per hectare found to Rs.12389.00. The lowest cost A1 was found in low adoption level of technology, due to minimum use of operational inputs in the production process. This cost was gradually increased with the increase in the different level of technology on sample respondent's farms respectively. The minimum average cost A1 found to Rs.9943.0 for low level technological status followed by Rs. 12387.0 for moderate and Rs.14837.0 for high technological adoption level per hectare

respectively.

(u) Resource use efficiency:

- (v) Bal *et.al.* (1983) conducted a study using Cobb-Douglas production function for studying resources productivity and factor share in crop production in central district of Punjab. They found that the elasticity of production for value of independent variables such as human labour, fertilizer, weedicide etc., has declined, but that of irrigation increased in 1980-81 over 1972-73. The average farm size has decreased from 8.17 to 6.22 hectare. Per hectare use of human labour decreased from 636.11 men hours to 568.11 men hours during 1972-73 to 1980-81 period. The average level of use of other factors has increased during this period MVP were higher than the factor cost for human labour and fertilizer.
- (w) Bhalerao (1992) studied input use efficiency of seeds, fertilizer insecticides, human labour and irrigation with the help of Cobb. Douglas production function fitted to data obtained from vegetables, rainfed and irrigated groundnut and mixed and pure mustard. The efficiency of input use is studied by estimating marginal value productivity (MVP), marginal cost (MC) ratio. The results indicate negative bi-values for labour for all the crops except mustard and over-use or misuse of seed, fertilizers and irrigation for some of the vegetables. MVP-MC ratio, were found to mostly greater than unity in vegetables and irrigated groundnut for most of the inputs.
- (x) Sharma *et.al.* (1992) observed that the elasticity coefficients with respected to human labour were positive and found to significant in all the crops other than chillies. Working capital turned out to be significant in the entire crop. However, bullock labour was found to be positive but non-significant. The marginal value productivity of working capital was higher than that of human labour in all the crops. Increasing returns to scale were observed in potato, peas, cauliflower and brinjal, indicating that it is rational to use more of inputs in these crops to get higher returns.
- (y) Raghuwanshi *et.al.* (1999) the costs, returns, and efficiency of input utilization for wheat production in Bundelkhand, Madhya Pradesh, were analysed using a Cobb-Douglas production function. The average cost of

cultivation was estimated as Rs 6496/ha. Yields, cost benefit ratio and net returns were higher on small farms than on larger farms. Of farm inputs assessed, fertilizers and irrigation had the most positive effect on wheat production.

(z) Production Constraints:

- (aa) Alshi *et.al.* (1988) conducted a study on the constraints in adoption of improved technology for commercial crops in Vidharbha district of Maharashtra for the period of 1987-88. Study observed that non availability of farm yard manure in the village, lack of funds to purchase the manures, risk due to uncertainly of rain, wrong belief among the farmers about fertilizer and inadequate amount of loan to purchase fertilizer and pesticides, failure to understand the importance of preventive measures and non availability of plant protection equipment were the major constraints in the use of pesticides in production process.
- (bb) Mannikar (1992) examined the low productivity of cotton in rainfed regions of India. They reported the caused of low productivity of cotton and classified as follows poor climate, unsuitable soils, inferior plant type and under cultivation of non certified seed, low plant population, limited weed control, lack of nutrients management high incidence of pest and diseases, non availability of input and storage, price and marketing inadequacies policies are suggested in the light of the analysis.
- (cc) Visawadia *et.al.* (2006) reported that there is a wide gap existed between the performance of the new Bt.cotton and the old hybrid cotton on the farmers field. Though some farmers were able to achieve high yields with the help of new technology (Bt.cotton), they seldom reached the levels attend the experimental station due to certain constraints. The lack of

availability of quality seeds of Bt.cotton was the main constraints followed by the lack of knowledge about the recommended package of practices, shortage of agricultural labour during peak seasons, in adequate supply and high price of fertilizer and lack of availability of micro nutrients fertilizer respectively.

CHAPTER III MATERIAL AND METHODS

Material and methods are important steps in research process which given the idea how the research is done systematically. We can say that it is guideline to understand a systematic and objective investigation of a subject in order to discover relevant information for present study. In this chapter, the material and methods used for selection of sample, collection of appropriate data to problems under study and statistical analysis used to get the results. In this chapter material and methods use for present study was stated in detail with the view of the stated objectives.

This material and methods is split into following four sub heads:

1. Study area.
2. Sampling procedure.
3. Nature and collection of data and method of enquiry.
4. Analytical procedure

Study area:

The study was conducted in Barwani district of Madhya Pradesh. District Barwani was selected purposively due to it has maximum area under cotton (58.0 thousand hectare) and convenience as well as knowing to well acquaintance of researcher.

Sampling Procedure:

For the study, multi stage sampling technique was used for drawing the sample. At the first stage, Barwani block in Barwani district was selected purposively due to most suitable area for cotton crop and well known for researcher. At the second stage, a list of villages in selected block was prepared as per ascending order of area under cotton crop. Among these villages, 5 villages were selected randomly. At the third stage, for the selection of farmers, a list of cotton growing cultivators of each village was prepared in ascending order to area under cotton crop and among them 100 farmers was selected randomly for the study.

Primary data:

Primary data were collected from sample cotton growers. The primary data were recorded regarding general information of the cotton growers, cropping pattern, farm resource structure and resource use pattern in cotton cultivation. The specific

and detail information on cost incurred and returns obtained in the cultivation of cotton were also collected from the sample respondent.

Cotton variety under study:

In the district under study Bt-hybrid cotton has covered more than 80% of the total cotton area. Hence, maximum cotton growers under study were cultivated Bt-hybrid cotton.

Period of the study:

All the collected primary data were related to the agricultural year 2011-12.

Collection of data:

The data were collected by survey method. The data on different aspects were collected through pre-tested interview schedule. Each of the selected samples cotton growers were approached personally for recording relevant data (Appendix-1).

Analytical procedure:

The primary data were classified and tabulated in the light of stated objectives of the study and analyzed as per the suitable statistics and economic tools as follows:

The estimates of profitability were based on different cost and return incurred in cotton cultivation.

(a) Cost concepts:

The cost of cultivation classified as recommended by, "Special Expert Committee on Cost Estimates, GOI, New Delhi", was used in this study. The cost concepts are given below:

Cost A₁: It includes: -

- i. Value of hired human labour,
- ii. Value of hired and owned bullock labour,
- iii. Value of hired and owned machinery labour,
- iv. Value of owned and purchased seed,
- v. Value of fertilizers, manures and chemicals,
- vi. Value of insecticide and pesticides,
- vii. Expenditure on irrigation,
- viii. Land revenue and taxes,
- ix. Interest paid on crop loan if taken,
- x. Depreciation on farm assets excluding land,
- xi. Interest on working capital,
- xii. Miscellaneous expenses.

Cost A₂: It includes-

Cost A₁ + rent paid for leased in land

Cost B₁: It includes-

Cost A₂ + interest on value of owned fixed capital assets. (Excluding land)

Cost B₂: It includes-

Cost B₁ + rental value of owned land

Cost C₁: It includes-

Cost B₁ + imputed value of family labour

Cost C₂: It includes-

Cost B₂ + imputed value of family labour

Cost C₃: Cost C₂ + 10 percent of cost C₂ to account for managerial input of the farmer.

Evaluation of farm inputs:

Methods followed in evaluating different farm input for the present study are described in the following paragraphs.

i. Hired human labour:

The farmers normally engage permanent farm labour on the basis yearly wages and casual labour on daily wages basis, for performing farm operations. The casual labour was evaluated on the basis of actual wages prevailed in the locality. The wages of male and female labour included payment given both in cash or kind. The value of kind components given to the labour was calculated at their prevailing market prices.

ii. Family labour:

The family labour cost was evaluated at the rate of prevailing wages in the locality for casual hired labour at various stages of operations.

iii. Bullock and machinery labour:

Estimation of bullock and machine labour charges on actual wage prevailed in the locality were considered.

For estimation of depreciation, interest on working capital, interest on fixed capital and rental value of owned land, following standard norms were used.

iv. Depreciation on farm assets:

The straight-line method is used for calculating rate of depreciation @ of 10 per cent.

v. Interest on working capital:

It is worked out @ 12.50 per cent for half of the duration of the crop.

vi. Interest on fixed capital:

Interest is charged @ 10.00 per cent per annum on the value of implements, machineries, farm building, and irrigation structure and drought animals. It excludes interest on land input, because rental value of owned land is calculated separately.

vii. Rental value of owned land:

It is calculated on the basis of (1/6) of the gross income or prevalent rate in the area for the same.

(b) Value of farm produce:

This includes the value of main product and the by product of the crop. The harvest price of the crop was considered for calculating the value of main produce. The value of by product was calculated at the prevailing price in the locality.

Profitability concepts:

For the estimation of profitability from Bt.cotton, the following efficiency measures were used in this study:

- (i) Gross income,
- (ii) Farm business income,
- (iii) Farm investment income,
- (iv) Net farm income,
- (v) Family labour income,
- (vi) Input- output ratio,

These are defined as under: -

- (i) Gross income:** It is defined as total value of main product +by product.
- (ii) Farm business income:** It is the gross value of output at farm harvest prices (Main product +by product) – cost 'A₁'

- (iii) **Farm investment income:** It is defined as net farm income + interest on fixed capital + rental value of owned land.
- (iv) **Family labour income:** it is defined as gross income- cost 'B₂'
- (v) **Net farm income:** It is defined as gross income – cost 'C₃'
- (vi) **Input – output ratio**

$$\text{Input- output ratio} = \frac{\text{Gross income}}{\text{Cost of cultivation}}$$

Analytical procedure for estimation of resource use efficiency:

Cobb-Douglas production function was used for the estimation of resource use efficiency in cultivation of cotton, it is widely used by various research workers for studying resource use efficiency and they obtain precise results.

$$Y = aX_1^{b_1} \cdot X_2^{b_2} \cdot X_3^{b_3} \dots \dots X_k^{b_k} + e$$

It is converted in to logarithmic form, so that it can be solved by the least square method. The logarithmic form of the Cobb-Douglas function is express as under:

$$\text{Log } y = \log a + b_1 \log x_1 + b_2 \log x_2 \dots \dots + b_k \log x_k + \log e$$

Where: y = Dependent variable

(gross income)

a = Constant or intercept value

b₁ to b_k = are regression coefficients of X₁ to X_k variables

and

X₁ to X_k = variables used

Economic optimum levels of inputs and their comparison with the existing levels:

An attempt was made here to estimate optimum level of the resources and compared them with the existing levels in order to point out increase over the existing returns.

The following formula was used to derive optimum levels of resources:

$$X_k = \frac{b_k \bar{c}}{P X_k (b_1 + b_2 + b_3 + \dots + b_k)}$$

Where,

b_1 to b_k are regression coefficients of 1st to K^{th} variables.

$P X_k$ is price of K^{th} variable

\bar{c} is capital constraints

Selection of variables:

In this study, the following variables were chosen for functional relationship between gross income from cotton production and expenditure on different input items on per hectare basis and they are as follows:

X1 = Human labour value in Rupees

X2 = Expenditure on seeds in Rupees

X3 = Expenditure on manure and fertilizer in Rupees

X4 = Expenditure on plant protection in Rupees

X5 = Expenditure on irrigation in Rupees

Y = Gross income from cotton production in Rupees

Definition of variables: -

Independent variables

(i) Expenditure on human labour in rupees (X_1): -

The human labour input was recorded in terms of day of eight hours of work, separately for man, women and child labour employed for different farm operations in cultivation of cotton during the crop period. The labours input for regression analysis were measured in terms of man day (eight hours). It included family labour and permanent and hired human labour.

(ii) Expenditure on seed in rupees (X_2): -

It included the value of owned and purchased seed at the prevailing market price in reference year in selected villages and measured in rupees per hectare.

(iii) Expenditure on fertilizers and manures in rupees (X_3): -

The actual market price of fertilizer at the time of sowing, and for purchased manure, actual paid out price was taken as cost of this input. For farm produced manure the cost was taken on the basis of prevailing market price in the area at the time of sowing, and this variable was measured in rupees per hectare.

(iv) Expenditure on plant protection in rupees (X_4): -

The actual market prices of insecticides and pesticides use in the cultivation of cotton were measured in rupees per hectare.

(v) Expenditure on irrigation in rupees (X_5): -

This variable constituted the fuel charges for diesel engine, electric charges for electric pump, repairing and maintenance charges, canal water charges,

depreciation and interest on fixed capital invested on irrigation structure. The amount paid for irrigation water hired from other sources was also included in this variable where as manual labour engaged in irrigation was not included in this variable.

Dependent variables: -

Gross value of output (Y): Gross value in rupees was calculated by converting the physical products into value terms by multiplying the output of cotton crop.

Constraint Analysis:

Constraints prevailing in the cultivation of cotton crop were enumerated according to their importance as confronted by the respondents.

CHEPTER - IV

RESULTS

The matter presented in this chapter is concerned with the analytical results as per the stated objectives. The chapter is consisting of four sections and each section has its own importance to answer as per the objectives of study.

- I. Socio-economic characteristics of respondents and farm resource structure.
- II. Analysis of cost and profitability in cultivation of cotton.
- III. Examine the resource use efficiency in the cultivation of cotton.
- IV. Enquiry into constraint in cotton production and suggestions to over come it.

4.1 Socio economic characteristics and farm resource structure:

Since the family characteristics and farm resource structure reflect the structure of farm-family with operational, organizational and managerial efficiency of the farm business. Hence, it is pertinent to study the characteristic of the respondents as below.

(a) Age and education level:

The important decision of the farm business with reference to use of inputs, cropping pattern and other farm managerial decisions are generally made by the farmer as the supreme of family. Therefore, it is pertinent to have an idea regarding the age and education level of respondents which are found to be more important characteristics in farm efficiency.

The data on distribution of respondent according to age and education are presented in table 4.1.

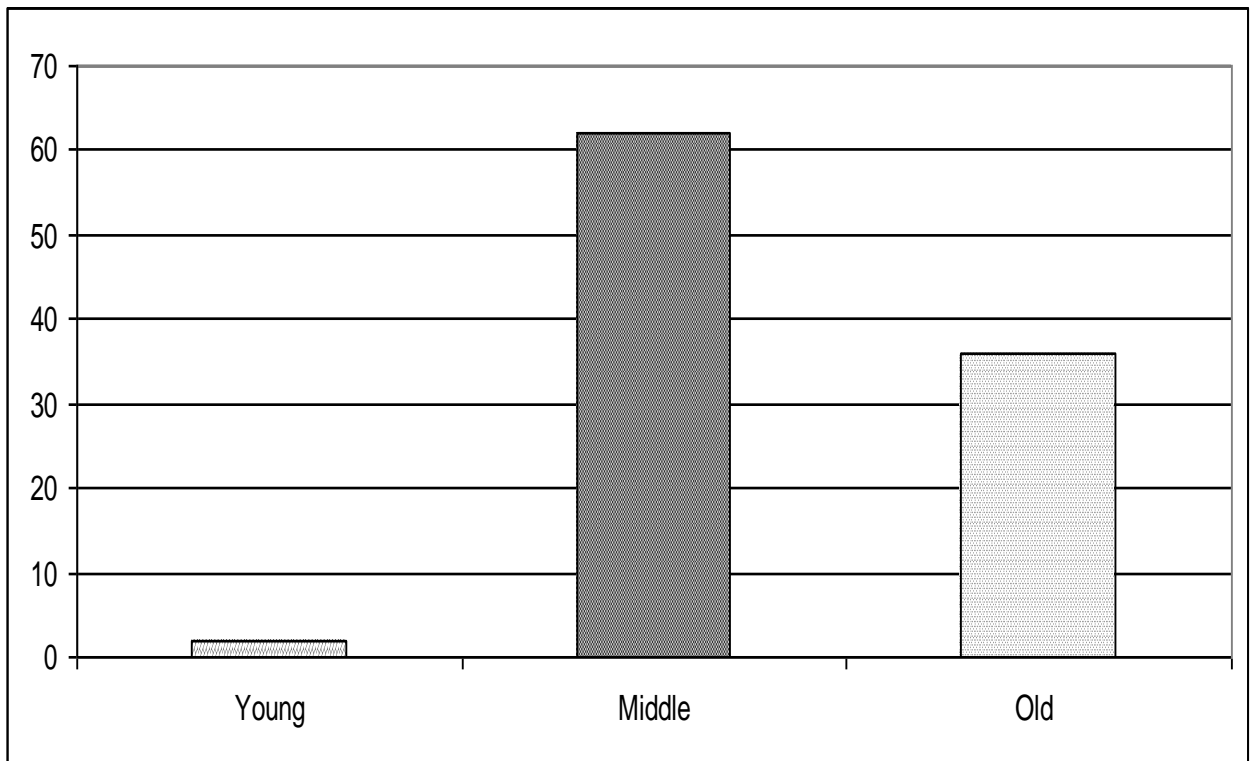
Table 4.1: Age and education levels of sample farmer.

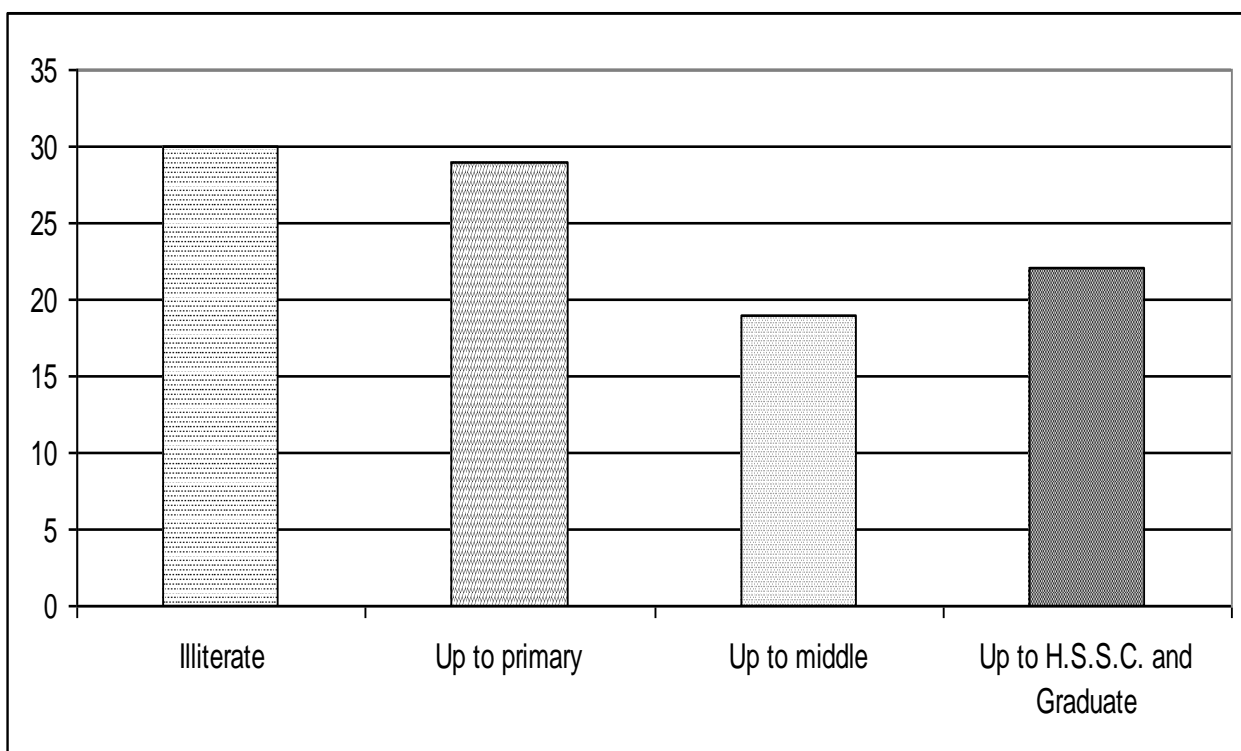
S.No.	Age	No. of farmers	% to total
a	Young (Upto 25 years)	02	02.00
b	Middle (25 to 50 years)	62	62.00
c	Old (Above 50 years)	36	36.00
	Total	100	100.00
	Average age year		45.00
	Education		
a.	Illiterate	30	30.00
b.	Up to primary	29	29.00
c.	Up to middle	19	19.00
d.	Up to H.S.S.C. and Graduate	22	22.00
	Total	100	100

As evident from the data presented in table 4.1, it appears that on an average

the respondents were 45.00 years old age. As per the classification, in young age group there are found to only 02 farmers followed by middle age group 62 farmers and old age group 36 farmers respectively.

The study revealed that majority of the respondents had an education level





between primary 29 farmers followed by middle 19 farmers and higher education 22 farmers respectively. It is interesting to note that 30 farmers were bearing no education i.e. illiterate.

Thus, it is concluded that the majority of the farmers 30 were found to illiterate hence, need to be aware towards increasing the literacy position.

(b) Composition of the family:

The family composition and average number of members in sample farm family is shown in table 4.2.

Table.4.2: Average strength of the sample family:

S.No.	Family Member	Number/farm	% to total
1.	Male	2	25.00
2.	Female	2	25.00
3.	Children	4	50.00
	Total	8	100.00

The table revealed that children (below 18 years of age) dominated in strength of family i.e. on an average 4 per family followed by male 2 person and female 2 person respectively. The average strength of the family was found to 8 persons per family.

Thus, it is concluded the average family size was found to be 8 person per family in which children was found to dominate.

(c) Work force in the family:

The distribution of respondents and their family members (male and female) as per definition of work force is presented in table 4.3.

Table 4.3: Distribution of family member as work force.

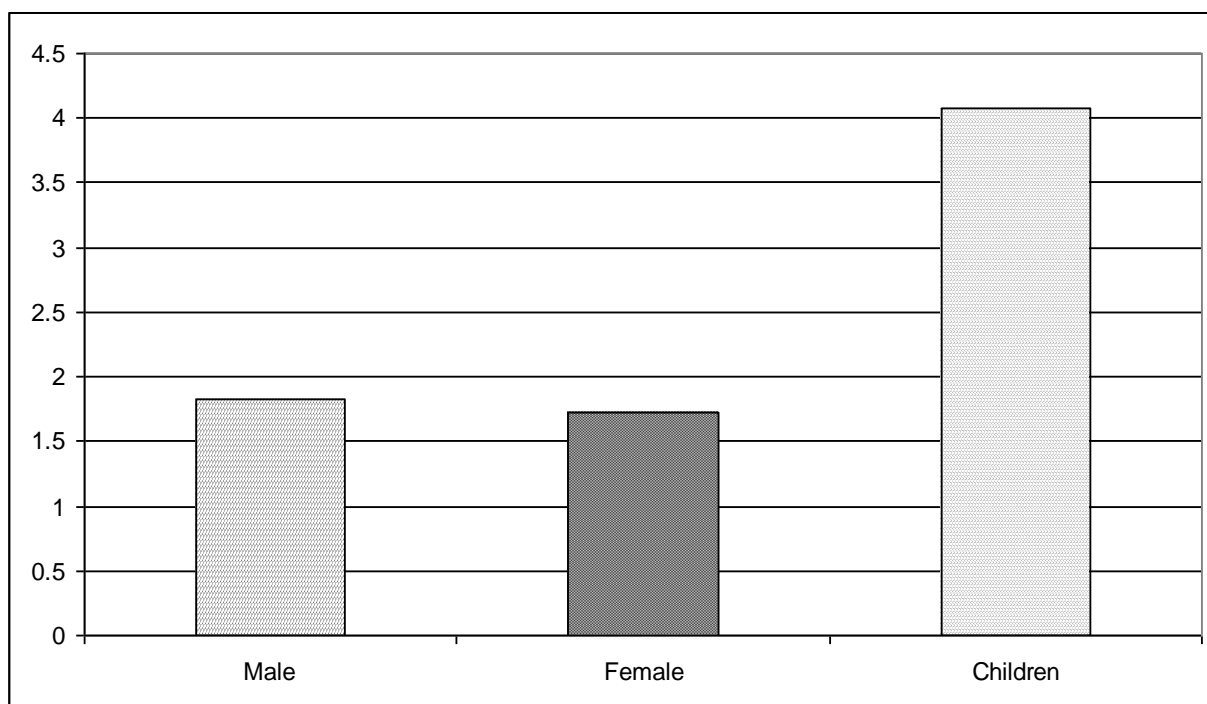
S.No.	Work force	Number/farm	% to total
1.	Male	2	66.67
2.	Female	1	33.33
	Total	3	100.00

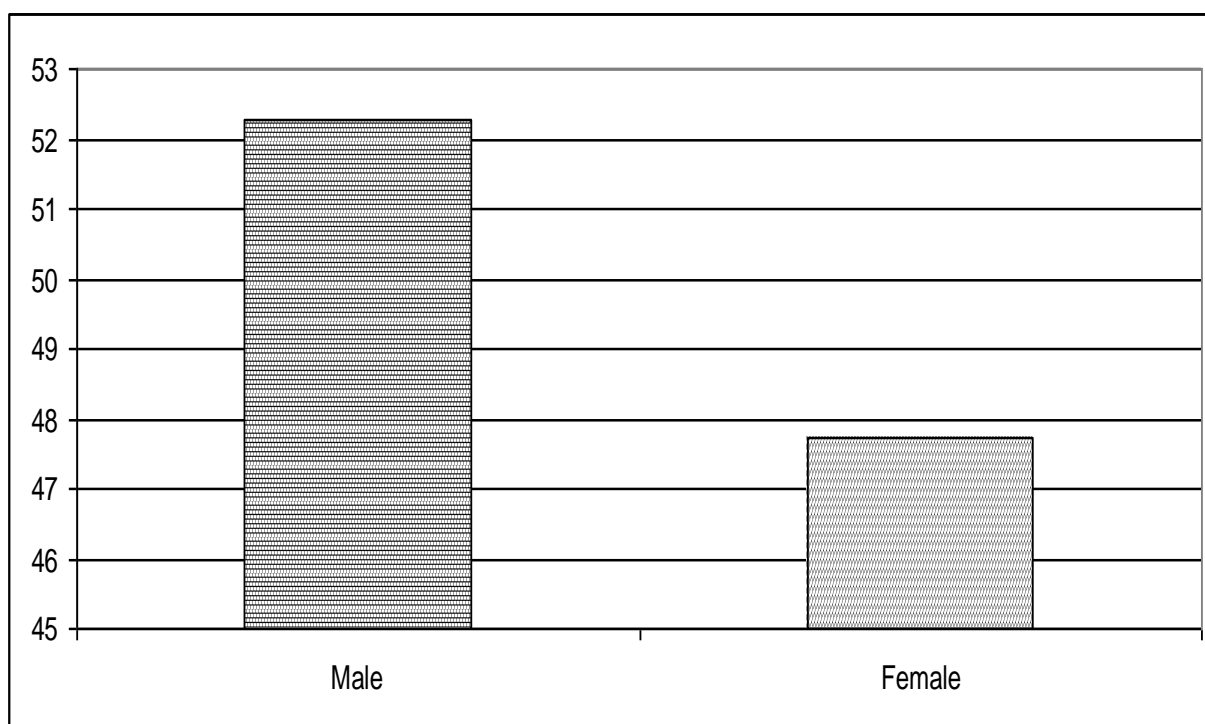
The table revealed that on an average 66.67 per cent of the total working force was male labour while the female labour was found to 33.33 per cent of total work force in the family. These economically active male and female workers performed or pursued so many works related with agriculture and other allied activities for earning the family income.

Thus, it is concluded that male workers found to be dominated in a family.

(d) Land use pattern and level of irrigation:

Land is the most important resource of farmers and it is the primary fixed input of production constituting the major portion of the fixed cost. The land use pattern and level of irrigation are given in table 4.4.





**Table 4.4: Land use pattern and level of irrigation on sample farm:
(hectare per farm)**

S.No.	Particulars	Average	% to total
1.	Size of holding	4.13	100.00
2	Uncultivated area	0.13	03.15
3	Cultivated area	4.00	96.85
4	Irrigated area	1.96	47.46
5	Kharif crop area	3.80	92.01
6	Rabi crop area	2.42	58.60
7	Gross cropped area	6.22	150.60
8	Area under cotton	2.21	53.51

Figures in parenthesis show percentage to size of holdings.

It is evident from the data that the average size of holding represents to 4.13 hectare per farm in the area. The table also clearly shows that the net cultivated area as percentage to size of holding was found to 96.85 per cent. The average irrigated area as a percentage of size of holding was found to be 47.46 per cent. Due to low irrigation facilities in the area only 150.60 per cent area was covered under crops in

a year (gross cropped area) when both the kharif and rabi crops were taken into consideration.

The cropping pattern of sample holding reflects towards crops and crop sequence grown in a year on unit of area. The study of cropping pattern clearly shows that kharif crops were predominating in area i.e. 92.01 per cent to size of holding. While under rabi crops the area was devoted only 58.60 per cent to size of holding. The area under cotton was found on an average 2.21 hectare per farm and i.e. 53.51 per cent to size of holding.

(e) Investment on fixed farm assets:

The values of the fixed farm assets in the farming generally show the level of farm machination and this cost was invested during the past years. The data on present average value of investment on fixed assets per farm is presented in table 4.5.

Table 4.5: Value of the total farm assets on sample farms. (Rs. thousand/farm)

S.No.	Assets	Average	% to total
1.	Land	798.05	92.95
2.	Farm house cum store	18.29	2.13
3.	Bullock	3.79	0.44
4.	Implements	38.46	4.48
5.	Total Value excluding land	60.53	7.05
6.	Total	858.58	100.00

The data presented in table 4.5 revealed that the value of the land is by and large the costliest asset among all the farm assets. On an average, total value of farm assets excluding the value of land on the sample cotton growing farms was Rs.60.53 thousand per farm. The above data showed that the maximum investment after land was on implements i.e. on an average (Rs.38.46 thousand) followed by farm house-cum-store (Rs.18.29 thousand) and bullock (Rs.3.79 thousand) on the sample cotton growing farms respectively.

4.2: Analysis of cost and profitability in cultivation of cotton:

A study on economics of cotton cultivation, as important kharif crop is pertinent to find out their profitability per unit of area. Secondly, it gives an estimate of the amount, the farmers will require for cultivating as per size of crop area with different level of technological adoption. It is a well known fact that profitability of crop production depends upon the level of input utilization, cost of production, yield per unit of area and their relative market prices or gross return. The details of cotton

production profitability are presented in different stages as below:

A) Input utilization:

The pattern of utilization of resources by the farmers indicates the degree of resources management, their choice and decision-making. Besides the above it also indicates the level of technology adopted by the farmers in cotton cultivation. Labour (Human, bullock, and machine) utilization, seed, manures, fertilizers plant protection and irrigation measures are the basic type of resources used being considered in the present study. The detailed information regarding input utilization of cotton cultivation and yield level on per farm and on per hectare is presented in table 4.6.

Table 4.6: Input utilization and level of yield in Bt-hybrid cotton cultivation.

S.No.	Input utilization	Unit	Per farm	Per hect.
1.	Cotton area	Hect.	2.21	1.00
2.	Human labour			
	Hired	Days	88.40	40.00
	Family	Days	154.69	70.00
3.	Bullock pair	Days	5.11	2.31
4.	Machine	Hrs.	7.92	3.58
5.	Seed+ treatment	Rs.	5016.50	2269.91
6.	Manure+ Fertilizer	Rs.	6920.85	3131.61
7.	Plant protection	Rs.	6136.50	2776.70
8.	Irrigation charges	Rs.	2581.45	1168.08
9.	Yield	Qut.	41.96	18.99

The table indicated that the average area under cotton was found to be 2.21 hectare. The expenditure on labour (human, bullock and machine) was mainly depended on the wage rate prevailing in the area. It is also found that most of the work was perform by family labour. The average family labour was devoted to 154.69 days, while hired labour was devoted to 88.40 days only per farm in cotton production.

Almost, maximum numbers of farmers have adopted cultivation of improved varieties of cotton i.e. Bt-hybrid cotton. The cost on seed was found to on an average Rs. 5016.50 per farm. Only few farmers in the area applied the farm yard manure. The use of chemical fertilizers was found to common practice, but the lacunae lies in using inadequate doses of fertilizers. The expenditure on manure and fertilizer was incurred Rs.6920.85 per farm. It is interesting to note that farmers used high expenditure on plant protection measure i.e. Rs.6136.50 per farm. More adoption of high yielding varieties is not enough to raise agricultural production unless, inputs like fertilizers, plant protection measures and irrigation are used at desirable level. The table clearly indicates that though, farmers were using these improved

technologies and improved inputs, but it is still quite low as compared to that recommended for cotton crop.

B) Yield level:

The average yield of cotton in the study area was found to 18.99 quintal per hectare.

C) Cost of cultivation of cotton:

The cost structures of cotton cultivation on sample farmer's are presented in table 4.7.

Table 4.7: Cost of cultivation of cotton on sample holding.

S.No.	Cost particulars	Average (Rs/ha)	% to total
1.	Hired human labour	4000.00	9.54
2.	Bullock labour	693.00	1.65
3.	Machine power	1070.00	2.55
4.	Seed	2269.91	5.41
5.	Fertilizer + manure	3131.61	7.47
6.	Plant protection	2776.70	6.62
7.	Irrigation	1200.00	2.86
8.	Interest on working capital	997.56	2.38
9.	Depreciation	732.80	1.75
10.	Land revenue	87.00	0.21
	Cost-A₁	16958.58	40.45
11.	Interest on fixed capital	3026.50	7.22
	Cost-B₁	19985.08	47.67
12.	Rental value of land	11127.50	26.54
	Cost-B₂	31112.58	74.21
13.	Imputed value of family labour	7000.00	16.70
	Cost-C₁	26367.55	62.89
	Cost-C₂	38112.58	90.91
	Cost-C₃ (C₂+10% of C₂)	41923.83	100.00

The table portrays that on an average cost of cultivation per hectare of cotton crop was found to be Rs.16958.58 (Cost A₁), Rs.19985.08 (Cost B₁), Rs.31112.58 (Cost B₂) respectively.

The total cost estimates i.e. cost C₁, C₂ and C₃ confiding the imputed values give an unrealistic and even misleading picture of costs. It is attributable to the fact that farmers try to minimize only out of pocket expenses of cultivation and that by and large, they make maximum use of resources they own, but it is also not justifiable to take into account only paid out cost. To determine the cost structure cost C₁, C₂ and C₃ were also analyzed in the present study. The study revealed that Rs.26367.55 incurred as (Cost C₁) followed by Rs.38112.58 (Cost C₂) and Rs.41923.83 (Cost C₃) respectively.

D) Profitability

Yield in quintals, gross income, net income and B.C. ratio are the tools employed for estimating the economics of production of crop. For this purpose, the profitability of cotton per hectare at different profitability measures is presented in table 4.8.

Table 4.8: Profitability of cotton crop.

S.No.	Returns	Quantum
1.	Main product (q/ha)	18.99
2.	By-product (q/ha)	10.00
3.	Gross Income (Rs/ha)	66765.00
4.	Farm business income	49806.42
5.	Farm investment income	38995.17
6.	Net income (Rs/ha)	24841.17
7.	Family labour income	35652.42
8.	Input- output ratio	1.59

The average productivity of cotton on sample holding was found to be 18.99 quintal per hectare. The prices per quintal received by the different farmers found to variation due to time factor of selling and respective price. The overall gross income (main product + by product) per hectare of this crop was found to be Rs.66765. The other measurement of farm profit per hectare also calculated as farm business income (Rs.49806.42), farm investment income (Rs.38995.17), net farm income (Rs.24841.17) and family labour income (Rs.35652.42). The average input- output ratio was observed 1.59.

4.3: Examine the resource use efficiency in the cultivation of cotton.

A) Resource use efficiency:

The production function analysis was carried out to examine the resource use efficiency in cotton cultivation along with values of R^2 and F ratio and presented in table 4.9.

Table 4.9: Production function coefficient of cotton crop on the sample farm.

S.NO.	Production variables	Regression value
1.	X1 Human labour	0.475 N.S. (2.872)
2.	X2 Seed	0.458 N.S. (10.168)
3.	X3 Manure & Fertilizer	0.070 N.S. (4.042)
4.	X4 Plant protection	-0.405 N.S. (8.821)
5.	X5 Irrigation	0.136 N.S. (11.049)
6.	(R^2) Coefficient of multiple determination	52.20%
7.	F – Ratio	20.492*

Note: Figures in parentheses indicated standard errors of respective co-efficient.

*Significant at 0.05 per cent level of probability

* R^2 Coefficient of multiple determination

The R^2 coefficient of multiple determinations clearly indicated that fitted function explain 52.20 per cent. This showed that 52.20 per cent variations in gross income of cotton cultivation were due to the included variables. The F-ratio for fitted function was found to high i.e. 20.492* indicated that fitted cobb-douglus production model is more useful and best fitted to the data. On overall average holding, expenditure on labour (Human), seed, manure, fertilizer, plant protection and irrigation influenced gross income of cotton crop but non significantly. This showed that the utilization of resources is being done positively.

It is observe from the table that cotton growers used their inputs more efficiently except plant protection measure, as remaining all the inputs independent variables shown positive contribution (non significant) on gross return of cultivation. Variable like expenses on human labour (0.475 N.S.), expenses on seed (0.458 N.S.), expenses on manure and fertilizer (0.070 N.S.) and expenses on irrigation (0.136 N.S.) shown their positive but non significant contribution on gross income of cotton production.

Regression analysis of plant protection measure with the gross income of cotton found to (-0.405 N.S.). The data on regression analysis shows that the farmers were not judiciously used the pant protection measure.

In nut shell, it is clear from the study that the expenditure on human labour, seed, manure and fertilizer and irrigation would contribute, non significantly in explaining variation in gross income respectively. On the other hand, expenses on plant protection measure found to not judicial used. Hence, it is suggested to the farmers in study area the utilization of plant protection measures should be judicious to get their contribution on gross income.

B) Optimum level of input utilization:

The optimum resource allocation was done with the present level of expenditure on resources under study and possibilities of increase in gross income through reallocation of resources in optimum direction was examined for cotton crop and data on the same is presented in table 4.10.

Table 4.10: Optimum level of input utilization in cultivation of cotton.

S.No.	Resources	Notation	Existing expenditure (Rs.)	Optimum expenditure (Rs.)	Gap (Rs.)
1.	Human labour	X1	11000.00 (47.26)	11522.02 (50.20)	+522.02
2.	Seed	X2	2269.91 (12.81)	2769.72 (15.63)	+499.81
3.	Manure & Fertilizer	X3	3131.61 (17.67)	3131.61 (17.67)	0.00
4.	Plant protection	X4	2776.70 (15.67)	1666.02 (9.40)	-1110.68
5.	Irrigation	X5	1168.08 (6.59)	1256.93 (7.09)	+88.85
6.	Expenditure level		20346.3 (100.00)	20868.32 (100.00)	0.00
7.	Estimated gross return		66765.00	67246.81	+481.81
8.	Estimated net return		24841.17	25322.98	+481.81

Figure in parenthesis show percentage to total expenditure

The table revealed that on an aggregate basis there is possibility of increasing gross return from cotton production by Rs.481.81 per hectare by reducing the expenditure on plant protection by Rs.1110.68 per hectare and increasing expenditure on human labour (Rs.522.02), seed (Rs.499.81) and irrigation (Rs.88.85) with present (existing) level of capital expenditure and adoption of technology.

Therefore, it can be concluded that there is very little possibility of increasing gross return income from cotton cultivation with the existing capital outlay and available technology.

4.4: Constraints analysis in cotton production and suggestion to overcome it: -

A) Constraints:-

The constraints analysis and suggestions was reported based on the opinion survey of the sample farmers. Thus, the generalizations of result are the feedback of the farmers engaged in cotton growing in the region. It is evident from the table (Input utilization and level of yield according to different size group) that farmers of different size group were using different quantity of inputs in cultivation of cotton per unit of area. Thus, utilization of different levels of yield attributing inputs and managerial efficiency might have be caused in yield difference in respective size group.

Several constraints barring the sustainable production of the traditional or local practices of cotton crop in the area are related to resources management, faults and stresses of abiotic and biotic nature.

The farmer's opinion was obtained regarding the factors affecting adversely

the adoption of various improved technology and practices with the suggestion to overcome the constraints, some of them are presented in Table 4.11.

Table 4.11: Production constraints identified by the sample farmers.

S. No.	Constraints	Overall N=100	Rank obtained
A	Natural cause (Average)	46	IV
1.	Low fertility of soil	34	iv
2.	Unfavorable climate	44	iii
3.	Uncertainty of rain	51	ii
4.	Damage due to insect pest	54	i
B.	Social cause (Average)	49	III
1.	Unavailability of labour at time	32	iv
2.	Low working capacity of labour	61	ii
3.	Family problems	69	i
4.	Not proper management of family labour	36	iii
C.	Economic cause (Average)	56	II
1.	Economic poverty	74	i
2.	Do not purchased recommended inputs	71	ii
3.	Unavailability of irrigation	43	iii
4.	Do not done agronomical practices proper and at the time	38	iv
D.	Technological cause (Average)	60	I
1.	Lack of technological knowledge	63	ii
2.	Unavailability of technical suggestions and guidance	52	iv
3.	Unavailability of training and demonstrations	66	i
4.	Costly improved technology	59	iii
E.	Institutional infrastructure cause (Average)	49	III
1.	Unavailability of inputs at time	41	iv
2.	Do not performed agricultural practices at time	62	i
3.	Unavailability of proper loaning system	42	iii
4.	Unavailability of proper distribution system	51	ii

The constraint confronted by farmers is divided into five parts and each part having their own importance. The most important constraints was technological cause got rank I followed by economic cause (rank II), social cause and institutional infrastructure cause both got (rank III) and natural causes (rank IV) respectively.

Among the technological cause, the important cause was unavailability of training and demonstrations reported by (66 farmers) followed by lack of technological knowledge (63 farmers), costly improved technology (59 farmers) and unavailability of technical suggestions and guidance reported by (52 farmers) respectively.

Among the economic cause, the maximum number of farmers (74 farmers) reported economic poverty followed by do not purchased recommended inputs (71 farmers), unavailability of irrigation (43 farmers) and do not done agronomical practices proper and at the time reported by (38 farmers) respectively.

Among the social cause, the important problem was family problems reported by (69 farmers) followed by low working capacity of labour (61 farmers), not proper management of family labour (36 farmers) and unavailability of labour at time reported by (32 farmers) respectively.

Among the institutional infrastructure cause, the most important problem was do not performed agricultural practices at time reported by (62 farmers) followed by unavailability of proper distribution system (51 farmers), unavailability of proper loaning system reported by (42 farmers) and unavailability of inputs at time reported by (41 farmers) respectively.

Among the natural cause, the maximum number of farmers (54) reported damage due to insect pest followed by uncertainty of rain (51 farmers), unfavorable climate (44 farmers) and low fertility of soil reported by (34 farmers) respectively.

B) Suggestions to over come the constraints:

Following suggestions have been made by respondents in study area to overcome the main constraints occurring in production process. The details as per the confronting suggestions by respondents are presented in table 4.12.

Table 4.12: Suggestions confronted by the sample farmers.

S. No.	Suggestions	Overall N=100	Rank obtained
1.	The inputs should be cheap	43	V
2.	The input should be available at time	55	II
3.	There should be knowledge about inputs use.	12	X
4.	There should be facilities for credit.	32	VIII
5.	There should be facilities for soil testing.	49	IV
6.	The market price should be fair.	71	I
7.	There should be proper marketing system.	35	VII
8.	There should be proper transportation.	37	VI
9.	The training and demonstration should be given.	53	III
10.	Other suggestions.	30	IX

The suggestions confronted by farmers are concerning into ten main points and each point having their own importance. The most important suggestion was the market price should be fair got rank Ist followed by the input should be available at time (rank II), the training and demonstration should be given. (rank III), there should be facilities for soil testing. (rank IV), the inputs should be cheap (rank V), there

should be proper transportation. (rank VI), there should be proper marketing system. (rank VII), there should be facilities for credit. (rank VIII), Other suggestions. (rank IX) and there should be knowledge about inputs use. (rank X) respectively.

CHEPTER V

DISCUSSION

In this chapter researcher describe in details of the findings arrived in research process. It consists of statement of the issue on which the study was focused or it is the statement and description of significant facts that are necessary for understanding the generalizations drawn. The purpose of this study is to evaluate the profit per unit of area and resource use efficiency in production of cotton in Madhya Pradesh.

Cotton being a commercial crop requires a judicious decision in the higher or intensive investment in the form of modern technology. Therefore, farmers are confronted with the problems of determining the productivity and profitability by increasing level of variable inputs in production process. Specially, it is important in the context of changing input-output prices, availability of recommended inputs and decision-making factor in the use of various technological statuses.

The present investigation is addressed to the farmers to acquaint them with the cost and profitability structure of cotton. The profit can be increase by two ways; firstly, increase the per unit area of yield without changing the cost structure (adoption of judicial yield attributing inputs). Secondly, by the keeping the constant yield with use of low cost technology (reducing the cost structure) on their farm. In both the practices, resource allocation is taken its own importance. Many attempts in recent past have been geared to cover the aspects of resource use efficiency which vastly vary in crop to crop and area to area. Hence, this study is an attempt to quantify the resource use pattern and its allocational efficiency in cotton crop in Barwani district of Malwa Plateau area due to find out how to increase the yield of cotton per unit of input. This study will focus that how efficiently the farmers are using their resources in production of cotton which is the main kharif crop in the area.

The farm business activities like production of crops are determined by the physical and financial resources available on the farms. The resources of the farmers comprise chiefly land, human labour, bullock labour, agricultural implements and machinery and other available capital. The distribution of cultivated area among the operational holdings has a great importance in farm management studies as the efficient performance of a farm is closely linked with the proportion of cultivated area

on it. Hence, the present study also deals with the farm structure of the selected farmers. It includes the size of operational holding, irrigated area, man and bullock farm power, investment in fixed capital.

Land is the most important resource of farmers and it is the primary fixed input of production constituting the major portion of the fixed cost. It is evident from the data that the average size of holding represents to 4.13 hectare per farm in the area. The table also clearly shows that the net cultivated area as percentage to size of holding was found to 96.85 per cent. The average irrigated area as a percentage of size of holding was found to 47.46 per cent. Due to low irrigation facilities in the area only 150.36 per cent area was covered under crops in a year (gross cropped area) when both the kharif and rabi crops were taken into consideration. On an average, total value of farm assets excluding the value of land on the sample cotton growing farms was Rs.60.53 thousand per farm. The above data showed that the maximum investment after land was on implements i.e. on an average (Rs.38.46 thousand) followed by farm house-cum-store (Rs.18.29 thousand) and bullock (Rs.3.79 thousand) on the sample cotton growing farms respectively.

A study on economics of cotton cultivation, as important kharif crop is pertinent to find out their profitability in order to choose best alternative resources, cultivation practices and scale of production etc. Secondly, it gives an estimate of the amount, the farmers will require for cultivating as per size of crop area with different level of technological adoption. It is a well known fact that profitability of crop production depends upon the level of input utilization, cost of production, yield per unit of area and their relative market prices or gross return. The total cost estimates i.e. cost C_1 , C_2 and C_3 based on the imputed values would give an unrealistic and even misleading picture of costs. It is attributable to the fact that farmers try to minimize only out of pocket expenses of cultivation and that by and large, they make maximum use of resources they own, but it is also not justifiable to take into account only paid out cost. To determine the cost structure cost C_1 , C_2 and C_3 were also analyzed in the present study. The study revealed that Rs.26367.55 incurred as (Cost C_1) followed by Rs.38112.58 (Cost C_2) and Rs.41923.83 (Cost C_3) respectively.

The average productivity of cotton on sample holding was found to 18.99 quintal per hectare. The prices per quintal received by the different farmers found to

variation. It was due to size of marketing cost and time of selling the produce which made differences on total gross return, respectively. The overall gross income (main product + by product) per hectare of this crop was found to Rs. 66765. The other measurement of farm profit like net farm income found to on an average Rs.24841.17 per hectare. The average B.C. ratio was observed 1.59 and it was found to very nominal.

It is observe from the table that cotton growers used their inputs efficiently except plant protection measure, as remaining all the inputs independent variables shown positive contribution on gross return of cultivation. Variable like expenses on human labour (0.475 N.S.), expenses on seed (0.458 N.S.), expenses on manure and fertilizer (0.070 N.S.) and expenses on irrigation (0.136 N.S.) shown their positive non significant contribution on gross income of cotton production.

The data revealed that on an aggregate basis there is possibility of increasing gross return from cotton production by Rs.481.81 per hectare by reducing the expenditure on plant protection by Rs.1110.68 per hectare and increasing expenditure on human labour (Rs.522.02), seed (Rs.499.81) and irrigation (Rs.88.85) with present (existing) level of capital expenditure and adoption of technology.

The constraints analysis and suggestions was reported based on the opinion survey of the sample farmers. Thus, the generalizations of result are the feedback of the farmers engaged in cotton growing in the region. It is evident from the table (Input utilization and level of yield according to different size group) that farmers of different size group were using different quantity of inputs in cultivation of cotton per unit of area. Thus, utilization of different levels of yield attributing inputs and managerial efficiency might have been caused in yield difference in respective size group. Several constraints barring the sustainable production of the traditional or local practices of cotton crop in the area are related to resources management, faults and stresses of abiotic and biotic nature. The constraint confronted by farmers is divided into five parts and each part having their own importance. The most important constraints was technological cause got rank I followed by economic cause (rank II), social cause and institutional infrastructure cause both got (rank III) and natural causes (rank IV) respectively.

CHEPTER VI

SUMMARY, CONCLUSIONS AND SUGGESTIONS

Summary:

Cotton is an important commercial crop of national significance because of its immense influence on Indian economy. Madhya Pradesh is one of the important cotton producing state in India covering more than 5.00 lakh hectares of land which account for 5.8 per cent of the area under cotton in India. The annual production of cotton in the state found to more than 5 lakh bales which are 4.5 per cent of national production. Sustainability of production, requisite quality, standards, rising costs of cultivation and resource use efficiency are some of the serious challenges for the researcher and cotton growers. On the view of above facts, it is important to examine the cost of cultivation of cotton and to know also how efficiently the farmers are using their resources at different level. If resource use is found to inefficient at any adoption level of cotton production technology then it can be increased by making adjustment in the present use of factors inputs in optimal direction. In case, it is efficient, the only way out for increasing cotton production would be the adoption of modern inputs and improved cotton production technology. Keeping the above facts in mind following objectives has been considered for study.

Objectives:

The specific objectives of the study were:

6. To study the economic characteristics of selected farmers.
7. To study the economic of cotton.
8. To examine the resource productivity and use efficiency.
9. To identify the problems in cotton production.
10. To suggest the ways and means for increasing the cotton production on the bases of existing results.

Barwani district of Madhya Pradesh has been selected for the purpose of this study because this district has area under cotton 58.67 thousand hectares of land with the production of 30.20 thousand tonnes in the year 2009-10 which shows the important cotton growing tract in the state. For the study, multi stage sampling technique was used for drawing the sample. At the first stage, Barwani block in Barwani district was selected purposively due to most suitable area for cotton crop

and well known for researcher. At the second stage, a list of villages in selected block was prepared as per ascending order of area under cotton crop. Among these villages, 5 villages were selected randomly. At the third stage for the selection of respondents, a list of cotton growing cultivators of each village was prepared in ascending order of their size of holding under cotton crop and 100 farmers were selected randomly for the study. Depending upon the objectives of the study primary data was used. The primary data was collected from selected respondents using pre-tested questionnaire schedule through survey method. Each selected respondents were approached personally for recording relevant data. The data was collected for the Agricultural year 2011-2012.

Analytical tools: -

Cost concept, A_1 to C_3 and profitability concept i.e. gross income, farm business income, farm investment income, net farm income, family labour income and input-output ratio was calculated for find of profitability.

The cost of cultivation classified as recommended by, "Special Expert Committee on Cost Estimates, GOI, New Delhi", was used in this study. The cost concepts are given below:

Cost A_1 : It includes: -

- xiii. Value of hired human labour,
- xiv. Value of hired and owned bullock labour,
- xv. Value of hired and owned machinery labour,
- xvi. Value of owned and purchased seed,
- xvii. Value of fertilizers, manures and chemicals,
- xviii. Value of insecticide and pesticides,
- xix. Expenditure on irrigation,
- xx. Land revenue and taxes,
- xxi. Interest paid on crop loan if taken,
- xxii. Depreciation on farm assets excluding land,
- xxiii. Interest on working capital,
- xxiv. Miscellaneous expenses.

Cost A_2 : It includes-

Cost A_1 + rent paid for leased in land

Cost B_1 : It includes-

Cost A_2 + interest on value of owned fixed capital assets. (Excluding land)

Cost B₂: It includes-

Cost B₁ + rental value of owned land

Cost C₁: It includes-

Cost B₁+ imputed value of family labour

Cost C₂: It includes-

Cost B₂ +imputed value of family labour

Cost C₃: Cost C₂ + 10 percent of cost C₂ to account for managerial input of the farmer.

Cobb-Douglas production function was used for the estimation of resource use efficiency as per one of the objective of study:

$$Y = ax_1^{b_1} x_2^{b_2} \cdot x_3^{b_3} \dots \dots \dots x_k^{b_k}$$

Where,

Y= Dependant variable (gross income)

a= Constant or intercept value

b₁ to b_k= Regression coefficient of x₁ to x_k variables

x₁ to x_k = variables

Constraints prevailing in the way of cultivation of cotton crop were enumerated according to their importance as given by the respondents.

CONCLUSIONS:

The following conclusions are drawn from the present study as follows:

- The average size of holding represents to 4.13 hectare per farm in the area. The table also clearly shows that the net cultivated area as percentage to size of holding was found to 96.85 per cent. The average irrigated area as a percentage of size of holding was found to 47.46 per cent. Due to low irrigation facilities in the area only 150.36 per cent area was covered under crops in a year (gross cropped area) when both the kharif and rabi crops were taken into consideration.
- The study portrays that on an average cost of cultivation per hectare of cotton crop was found to Rs.16958.58 (Cost A₁), Rs.19985.08 (Cost B₁), Rs.31112.58 (Cost B₂) respectively. To determine the cost structure cost C₁, C₂ and C₃ were also analyzed in the present study. The study revealed that Rs.26367.55 incurred as (Cost C₁) followed by Rs.38112.58 (Cost C₂) and Rs.41923.83 (Cost C₃) respectively.

- The average productivity of cotton on sample holding was found to be 18.99 quintal per hectare.
- The overall gross income (main product + by product) per hectare of this crop was found to be Rs.66765. The other measurement of farm profit per hectare also calculated as farm business income (Rs.49806.42), farm investment income (Rs.38995.17), net farm income (Rs.24841.17) and family labour income (Rs.35652.42). The average input- output ratio was observed 1.59.
- The R^2 coefficient of multiple determinations clearly indicated that fitted function explain 52.20 per cent. This showed that 52.20 per cent variations in gross income of cotton cultivation were due to the included variables. The F-ratio for fitted function was found to high i.e. 20.492* indicated that fitted cobb-douglus production model is more useful and best fitted to the data.
- Study revealed that variable like expenses on human labour (0.475 N.S.), expenses on seed (0.458 N.S.), expenses on manure and fertilizer (0.070 N.S.) and expenses on irrigation (0.136 N.S.) shown their positive but non significant contribution on gross income of cotton production. Regression analysis of plant protection measure with the gross income of cotton found to (-0.405 N.S.). The data on regression analysis shows that the farmers were not judiciously used the pant protection measure.
- It can be concluded that there is very little possibility of increasing gross return income from cotton cultivation with the existing capital outlay and available technology.
- The constraint confronted by farmers is divided into five parts and each part having their own importance. The most important constraints was technological cause got rank Ist followed by economic cause (rank IInd), social cause and institutional infrastructure cause both got (rank IIIrd) and natural causes (rank IVth) respectively.

Suggestions:

The critical study has developed many policy implications as follows:

1. The study of cotton cultivation revealed that cotton was found to be profitable in the area. To get the maximum profit from cultivation of cotton per unit of area, the farmers should be used the inputs in a judicious manner with the efficient practices.

2. Proper and judicious fertilizer application and plant protection measure should be used which will minimize the cost of production in one way and will increase the optimum yield and net return in another way. The availability of recommended insecticides/ pesticides should be insured by institution responsible for their supply. The farmer should be more adopted integrated nutrient management and integrated pest management techniques which may be help full in minimizing the input cost and hazard also.
3. The technological development involves a fair balance between welfare and productive services. This feature departs a great deal from the present methods of cultivation and allocation of resources on redrawn priorities. Hence, farmers should given priority to use their resources on the basis of economic viability with proper management of their farm.
4. Social services in respect of agricultural development such as education, training and other extensive activities have a strong case both on economic and welfare grounds. But if they do not lead to productive efficiency then they are sterile and consume an over increasing recurrent allocation causing depletion of resource for productive purposes. Hence, even in the sphere of education and extension works emphasis need to be laid on enhancing productive capacity of the population and the agricultural field.
5. The results of resource use efficiency and resource use pattern in production of cotton showed that adoption of new agricultural technology is marginal. The crop productivity could be increased in the area through the higher use of improved inputs and practices.
6. Lack of knowledge of farmers about proper use of modern agricultural technologies with regard to local edaphic and agronomic conditions are the principal reasons for a virtual non-response of these farmers to the adoption of proposed innovations. Hence, it is paramount important to involvement of extension workers through out the year on farmers field.
7. Adaptive research must be conducted in the areas where research on cotton crop and complementary crops is done. Agricultural research institutions should be taken varietal improvement and development of suitable agronomic practices for varying soils and geographic situations. Economic study to be conducted suggests optimal cropping pattern and practices including recommendations for varying quantities of fertilizer applications under varying price and output

situations. Extensive research on promising varieties and cropping practices by joint teams of research and extension workers to be done.

- 8.** Some of the farmers follow uneconomic method of cultivation or not applying adequate inputs and practices, resulting into lower yield. They have lost faith in what is said but they have faith when they see with their own eyes, similarly farmer's follow apart from seed and fertilizer, traditional methods of plant protection measures and those who use scientific methods do not follow in proper time and as per recommendations. Hence, result of recommended technology is very necessary to demonstrate to the farmers.
- 9.** Agro-compatibility etc. have not reached to the majority of the farmers in the region, use of improved farm implements for various field preparations to reduce the cost of cultivation and other practices are also need to be made popular among the farm community of the area. The over all aim should to trained farmers in the cotton production techniques under existing economic and other requisite condition to the extent so as to improve productivity of cotton crop.
- 10.** In the last, the productivity and production mostly depends on efficient farm management and financial resources of the farmers. To fight the battle for a shift in his attitude from one of farming for subsistence to that of farming for profit, the farmer must be provided with technical knowledge. But it is even more necessary to stimulate him to produce more by assuring him monetary rewards for his investment and enterprise on a scale which dose not compare unfavourably with other forms of productivity work.

CHAPTER -VII

BIBLIOGRAPHY

- Allawa Santi lal (2008). A study on economics of graded technology of Bt cotton in Dhar district of Madhya Pradesh. *M.Sc. (Ag.) thesis submitted to J.V.K.V.V. Jabalpur.*
- Alshi.M.R.,Bhole,B.D. and Bidwai,P.N. (1988). "Constraints of improved technology for commercial crops: A case study of crops in Vidharbha." *Indian.J.Agril.Econ.* **43**(3):525-26.
- Bal,N.K.,Singh,B, and Bal (1983). Resource productivity and factor share in crop production in central district of Punjab (summary). *Indian Journal of Agriculture Economics.* **38**(3): 514.
- Basu,A.K.; Narayan,S.S. and Phundan,S. (1992). "Economics of cotton production in India". *Agril. Situ. In India.* **47**(5):365-373.
- Bennett,R.; Buthelezi,T.J.; Ismael,Y.; Morse,S. (2003). Bt cotton, pesticides, labour and health: a case study of smallholder farmers in the Makhathini Flats, Republic of South Africa. *Outlook on Agriculture.* **32**(2):123-128.
- Bennett,R.; Ismael,Y.; Morse,S. and Shankar,B. (2004). Reductions in insecticide use from adoption of Bt cotton in South Africa: impacts on economic performance and toxic load to the environment. *Journal of Agricultural Science.* **142**(6):665-674.
- Beyers,L.; Ismael,Y.; Piesse,J.; Thirtle,C.G. (2002). Can GM technologies help the poor. The efficiency of Bt.cotton adopters in the Makhathini Flats of *KwaZulu Natal. Agrekon.* **41** (1):62-74.
- Bhalerao, M.M. (1992). Input use efficiency in Indian Agriculture- A study of Vegetable and oilseeds. *Indian J. Agril. Econ.* **47** (3): 485-486.
- Gouse,M.; Kirsten,J.F.; Jenkins,L. (2003). Bt cotton in South Africa adoption and the impact on farm incomes amongst small-scale and large scale farmers. *Agrekon.* **42**(1):15-28.
- Ismael,Y.; Bennett,R. and Morse,S. (2002). Benefits from Bt cotton use by smallholder farmers in South Africa. **5**(1):1-6.

- Ismael, Y.; Beyers, L.; Thirtle, C. and Piesse, J. (2002). Efficiency effects of Bt cotton adoption by smallholders in Makhathini Flats, KwaZulu Natal, South Africa. *Economic and social issues in agricultural biotechnology*. 325-349.
- Mannikar (1992). Productivity analysis of cotton in rainfed regions of India. *Agricultural Marketing*. **25** (2):38-41.
- Narayanan, S.S. and Singh, P (2009). Role of Indian seed industry in cotton production. *J. Indian Soc. Cotton Improv.* **34**(2):59-80.
- Palvi Nayan, K. (2006). A study on relative profitability of different varieties of Bt Cotton in Khandwa district of Madhya Pradesh. *M.Sc. (Ag.) thesis submitted to J.V.K.V.V. Jabalpur*.
- Pray, C.E.; Huang JiKun; Hu RuiFa and Rozelle, S. (2002). Five years of Bt cotton in China the benefits continue. *Plant Journal*. **31**(4): 423-430.
- Raghuwanshi, R.S; Awasthi, P.K. and Sharma, P.(1999). Resource use efficiency in wheat cultivation. *Indian Journal of Agricultural Research*. **33** (1): 67-71.
- Ramamoorthy, K. (1990) "Economics of cotton production in India" cotton scenario in India. *Aouvenir*. 103-108.
- Reddy, R.; G.V.T. Raju and A. Janaiah (1997) The comparative economics of cotton cultivation: a case study in Guntur district of Andhra Pradesh. *Journal of Research ANGRAU*. **25**(1): 46-50.
- Sharma, A.K.; Oberai, R.C. and Moorti, T.V. (1992). Resource use efficiency and profitability of Vegetable farming in Himachal Pradesh. *Indian J. Agril. Econ.* **47**(3): 505-506.
- Visawadia, H.R.; A.M. Fadadu and V.D. Tarpara (2006). A comparative analysis of production and marketing of Bt. Cotton and Hybrid cotton in Saurashtra region of Gujarat State. *Agril.Econ.Res.Review*. **19**:293-300.
- Yousouf Ismael; Bennett, R. and Morse, S. (2002). Farm-level economic impact of biotechnology: smallholder Bt cotton farmers in South Africa. *Outlook on Agriculture*. **31**(2): 107-111.

DEPARTMENT OF AGRICULTURE ECONOMICS
COLLEGE OF AGRICULTURE, SEHORE (M.P.)
INTERVIEW SCHEDULE

Title : Farm profitability, resource use efficiency and production constraints of cotton cultivation in Barwani district of Madhya Pradesh.

Name of Instructor: Dr. P.K.Malviya

Name of investigator: Ranjeet Dawar

(अ) सामान्य जानकारी

1. कृषक का नाम : श्री

2. पिता/पति का नाम : श्री

3. जाति : (सामान्य/पिछड़ा वर्ग/अ.जाति/अ.जनजाति)

4. पता : ग्राम तहसील

जिला प्रदेश

5. परिवारिक जानकारी

क्रमांक	सदस्य का नाम	उम्र	लिंग	शिक्षा	मुखिया से संबंध	व्यवसाय
(i)						
(ii)						
(iii)						
(iv)						
(v)						
(vi)						
(vii)						

6. जोत का विवरण

(i) स्वयं की भूमि हेक्टर कुल राजस्व की राशि रूपये

.....

(ii) किराये पर ली गई भूमि हेक्टर कुल दी गयी राशि रूपये

.....

(iii) किराये पर दी गई भूमि हेक्टर कुल ली गयी राशि रूपये

.....

(iv) कुल जोता गया क्षेत्रफल हेक्टर

7. भूमि उपयोग विवरण

क्रमांक	विवरण	क्षेत्रफल (हेक्टर)
(i)	शुद्ध बोया गया क्षेत्र	
(ii)	स्थायी पड़त भूमि	
(iii)	चालू पड़त भूमि	
(iv)	कृषि उत्पादन योग्य बेकार पड़ी भूमि	
(v)	कृषि अयोग्य भूमि सड़क मार्ग	

8. सिंचाई के साधनों का विवरण

क्रमांक	स्रोत	सिंचित क्षेत्रफल	क्रमांक	स्रोत	सिंचित क्षेत्रफल
(i)	कुओं द्वारा		(iv)	नहर द्वारा	
(ii)	नलकूप द्वारा		(v)	नदी नालों द्वारा	
(iii)	तालाब द्वारा		(vi)	अन्य	

9. प्रक्षेत्र सम्पत्ति विवरण

क्रमांक	विवरण	क्षेत्र/संख्या	वर्तमान कीमत	अनुमानित वार्षिक किराया	उपयोग के वर्ष
(i)	भूमि				
(ii)	भवन				
(iii)	सिंचाई यंत्र/साधन				
(iv)	उपकरण/यंत्र (अ) मुख्य उपकरण (ब) लघु उपकरण				

(v)	अन्य				
(vi)	कुल योग				

10. फसल पद्धति :

क्रमांक	विवरण	किस्म	क्षेत्रफल (हेक्टर)		
			सिंचित	असिंचित	अर्द्धसिंचित
(i)	खरीफ				
	(अ)				
	(ब)				
	(स)				
	कुल खरीफ क्षेत्र				
(ii)	रबी				
	(अ)				
	(ब)				
	(स)				
	कुल रबी क्षेत्र				

(ब) कपास फसल का आय-व्यय विश्लेषण

अ. मजदूरों पर खर्च :

क्र.	क्रियाएँ	पारिवारिक श्रम संख्या दिन	किराये का श्रम संख्या दिन	बैल श्रम संख्या दिन	मशीन श्रम घंटे
1	भूमि की तैयारी				
(अ)	जुताई				
(ब)	बखरनी				
2	खाद/उर्वरक				
3	बीजोपचार				
4	बुवाई				
5	पौध संरक्षण				
6	निदाई				
7	सिचाई				
8	तुडाई				

5	मिट्टी परिक्षण सुविधा होना चाहिए	हाँ / नहीं
6	उचित मूल्य मिलना चाहिए	हाँ / नहीं
7	उचित विपणन व्यवस्था होना चाहिए	हाँ / नहीं
8	उचित यातायात व्यवस्था होना चाहिए	हाँ / नहीं
9	प्रशिक्षण एवं प्रदर्शन देना चाहिए	हाँ / नहीं
10	अन्य	हाँ / नहीं

VITA

The author **Ranjeet Dawar S/O** Shri Kalu Dawar was born on 02 April 1988 in District Barwani (M.P.). He passed his primary school, Bhami, High school Govt. Boys school at Barwani and higher secondary school certificate examination with first division in 2006, from Govt. Higher secondary School Barwani M.P. He was admitted for B.Sc (Agri.) in 2006 in RAJMATA VIJAYARAJE SCINDIA KRISHI VISHWA VIDYALAYA, College of Agriculture Sehore, (M.P.), and secured his degree with on OGPA. 6.81 out of 10.00 scale in 2010.

Then he joined M.Sc. (Agril. Economics) in the 1st semester, 2010-11 at R.A.K. College of Agriculture, Sehore to specialize in “Agricultural Economics and Farm Management” and partial fulfillment of the requirements for the award of the same, he allotted with interesting problem “**FARM PROFITABILITY, RESOURCE USE EFFICIENCY AND PRODUCTION CONSTRAINTS OF COTTON CULTIVATION IN BARWANI DISTRICT OF MADHYA PRADESH**” for thesis work which has been completed by him and presented in this thesis.

He is now submitting the thesis after completing the course with 7.17 OGPA out of 10.00 point scale.

(Ranjeet Dawar)