ECONOMICS OF PRODUCTION AND MARKETING OF PEARL MILLET IN BEED DISTRICT OF MAHARASHTRA

By

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B.Sc. (Agriculture)

MASTER OF SCIENCE

IN

AGRICULTURE

(AGRICULTURAL ECONOMICS)

DEPARTMENT OF AGRICULTURAL ECONOMICS

COLLEGE OF AGRICULTURE, LATUR

VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH,

PARBHANI 431 402 (M.S) INDIA

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A thesis submitted to the

Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani

in partial fulfilment of the requirements for the degree of

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2021

DECLARATION BY THE CANDIDATE

I hereby declared that the thesis entitled, **"ECONOMICS OF PRODUCTION AND MARKETING OF PEARL MILLET IN BEED DISTRICT OF MAHARASHTRA"**, submitted by me is based on the actual work carried out by me under the guidance and supervision of **CHAVAN RANJEET VITTHALSINH**. The extent of information derived from the existing literature have been duly cited and referenced. The existing research work or its any part is not submitted anywhere else for the award of any degree or diploma.

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Research Guide

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(Naiknaware Ajay Rangnathrao)

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List of Symbols & Abbreviations

Av.	:	Average
Cm	:	Centimeter
CV	:	Coefficient of Variance
EGS	:	Employment Guarantee Scheme
EP	:	Elasticity of Production
et al.	:	Et allia (and others)
Fig.	:	Figures
GDP	:	Gross Domestic Product
Govt.	:	Government
i.e.	:	that is
KCC	:	Kisan Credit Cards
KGC	:	Kisan Gold Cards
Misc.	:	Miscellaneous
MP	:	Marginal product
MVP	:	Marginal Value of Product
NHB	:	National Horticulture Board
NHM	:	National Horticulture Mission
No.	:	Number
R^2	:	Coefficient of multiple determination
SAUs	:	State Agricultural Universities
SD	:	Standard deviation
Sq.cm.	:	square centimeter
TAMAFED	:	Tamil Nadu Mango Growers Federation
TCB	:	Tissue Culture Banana
USA	:	United State of America
Viz.,	:	Namely
VNMKV	:	Vasantrao Naik Marathwada Krishi Vidyapeeth
%	:	per cent
@	:	at the rate

THESIS ABSTRACT

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1) Title of the Thesis	:	**ECONOMICS OF PRODUCTION AND MARKETING OF PEARL MILLET IN BEED OF MAHARASHTRA**
2) Full name of the candidate	:	**NAIKNAWARE AJAY RANGNATHRAO**
3) Full name of the Research Guide	:	**CHAVAN RANJEET VITTHALSINH**
4) Department	:	Agricultural Economics
5) College	:	College of Agriculture, Latur
6) Degree to be awarded	:	M.Sc. (Agri.)

ABSTRACT

Pearl millet (Pennisetum typhoids L.) belongs to the family graminae. It is popularly known as bajra. The origin of pearl millet has been traced to tropical Africa, cultivation subsequently spread to East and Southern Africa and Southern Asia. It is the most widely grown type of millet, under the millet group. Pearl millet has a number of advantages that have made it the traditional staple cereal crop in subsistence or low resource agriculture in hot semiarid regions like the West Africa Sahel and Rajastan in North Western India. It is well adapted to the production system characterized by drought, low soil fertility and high temperature. It performs well in soils with high salinity or low pH. It is known as 'Kambu' in Tamilnadu, 'Dukhen' in Arabic and 'Mahangu' in Africa.

An attempt has been made to study economics of selected farming systems in Latur district of Maharashtra. Multistage sampling adopted in selection of district, tehsils, villages and selection of pearl millet growers. At first stage, Beed district was purposely selected on the basis of availability of pearl millet area. At second stage, two tehsils of Beed district were selected on the basis of area under pearl millet production. At third stage, from each selected tehsil, three villages were selected on the basis of higher area under pearl millet cultivation and at final stage, the separate list of pearl millet growers was obtained from each village and fifteen

pearl millet growers were selected randomly from each village. Thus, 90 pearl millet growers were selected for study.

Maximum i.e 66.66 per cent pearl millet grower come under 40-55 year age group. Family size was 6.11 members, of which 4.11 persons were acted as family labours. Out of 90 pearl millet growers, maximum i.e. 28.89 per cent were educated up to higher secondary level. Average land holding of pearl millet grower was 3.95 ha in which area under pearl millet was found to be 0.84 ha. The composition of livestock was 2.21 milch animals and 1.00 bullocks were reared on pearl millet farm. In summer season vegetables were grown on 3.54 per cent and sugarcane was the major crop cultivated by pearl millet grower on 12.40 per cent area of gross cropped area. The net sown area 2.66 ha and double crop area 1.29 ha with cropping intensity was 148.49 per cent.

Per hectare 13.42 and 5.64 man days of hired human labour and family human labour were utilized for one ha pearl millet cultivation. Per hectare total cost of cultivation of pearl millet i.e cost-C was Rs. 18067.03 out of which cost-A was 67.30 per cent and cost-B was 94.35 per cent. Average farm size of pearl millet was 0.50 ha, and production was 9.57 q. In channel I, II and III, producer has incurred Rs.25.98, Rs.33.69 and Rs. 38.17 per quintal as marketing cost. Per quintal marketing cost incurred by retailer in channel II and III was Rs. 35.28 and Rs. 41.23, respectively. Price spread in channel I was Rs. 25.98 which was the marketing cost incurred by producers only. In channel II per quintal price paid by was Rs.2435.56, total marketing cost in channel II was Rs. 68.97 and total marketing margin was Rs. 35.28, In channel III price paid by consumer was Rs. 2481.55. Low market price for pearl millet was the major constraint reported By 70 per cent growers and 72.22 per cent growers suggested that storage structures should be available at village level to overtake the problem. low rainfall which was reported by 47.77 per cent growers and therefore low yield of pearl millet were harvested by the growers. About 61.11 per cent growers suggested to use rain water harvesting technique and its conservation in farm ponds.

(**Keywords:** Cost and return, Marketing cost, Marketing margin, Marketing efficiency and Price spread)

CHAPTER-I
INTRODUCTION

CHAPTER- I

INTRODUCTION

Pearl millet *(Pennisetum typhoid* L.) belongs to the family *graminae*. It is popularly known as bajra. The origin of bajra has been traced to the tropical Africa, cultivation subsequently spread to East and Southern Africa and Southern Asia. It is most widely grown type of millet, under the millet group. Pearl millet has number of advantages that have made it the traditional staple cereal crop in subsistence or low resource agriculture in hot semiarid regions like the West Africa Sahel and Rajasthan in North Western India. It is well adapted to the production system characterized by drought, low soil fertility and high temperature. It performs well in soils with high salinity or low pH. It has various names such as pearl millet, Cattail or spiked millet in English. It is known as 'Kambu' in Tamilnadu, 'Dukhen' in Arabic and 'Mahangu' in Africa.

In traditional growing areas in India and many African countries, pearl millet is the basic staple for some of the poorest households. The grain is consumed in the form of leavened or unleavened breads, porridges, boiled or steamed food and (alcoholic) beverages. In the Sahel and elsewhere in West Africa, pearl millet is an important ingredient of cocoas. It grain is generally superior to sorghum as human food and at least equals maize in value as a feed grain, whereas grain is the main purpose of cultivation in Africa and Asia. Pearl millet can substitute wheat and rice in processed foods.

The food grain economy in India is characterized by stagnation in yields, for a rainfed crop like pearl millet, where there is heavy reliance of weather, there is added problem of instability of production which emanates from fluctuations in area as well as yield. In order to explain the fluctuations in pearl millet production there is need to identify the factors causing wide variability in its production at the regional level. The extent to which farmer's responses to area allocation and yield are governed by such factors at district level is also to be measured for policy decisions

Nuritional value of pearl millet

Millet is nutritionally superior to rice and comparable in many aspects with Wheat. Millet is packed pills of energy, protein, minerals and vitamins. Most

millet have more than 10 per cent protein. Pearl millet is a rich source of iron. It is also high in phosphorus and calcium. Pearl millet grains and foxtail millet bran are rich sources of fat (3 to 5 percent) which can be extracted as in maize and rice. Though pearl millet is a nutritive, energy rich but neglected crop, it can be very well used in preparation of different products.

Uses of pearl millet

Various types of traditional health foods can be prepared form pearl millet such as *Bhakar, Bundiladdu, Burti, Chakli, Chiwada, Dive, Kharibundi, Khichadi, Masala Papad, Shev, Thcdipeeth*and *Vade.* Also the major types of foods are porridges, which are common in Africa, next is the flat bread either fermented or unfermented. Other products are couscous, boiled rice-like preparations, snacks from blends with legume flours and non fermented or fermented beverages in Africa. All these products are made from either coarsely or finely ground millet flour usually with separation and removal of the bran. *Idli* is a steamed products made in India, usually for breakfast, from a fermented mixture of pearl millet and legume flour. Pearl millet based baby food prepared from 70 per cent flour, 13 per cent malt and 17 per cent milk powder increases digestibility and loweres the viscosity of foods and provide adequate protein and energy level for one year old children.

Although, pearl millet was developed as a food crop and is still primarily used this way, its grain is most likely to be used for animal feed. It is used as a low-cost substitute for maize in poultry and dairy feed. Typically the protein content of pearl millet is 45 per cent higher than feed corn and is also 40 per cent higher in lysine. This higher protein and other feed characteristics have helped to drive the interest in grain by poultry producers and other livestock producers. Millet fodder can be fed to cattle, used to thatching or fencing and as fuel. The recent discovery of sugary (stalked) sorghum and sweet (stalked) pearl millet with high brier has added a new dimension to their utilization, commercial grade jaggery and sugar can be produced from the stem juices. The crushed stalks can still be fed to cattle after certification or used in making boards. The molasses can yield industrial alcohol.

Intearnational Scenario of pearl millet cultivation

Pearl millet is the sixth most important cereal crop after the wheat, rice, maize, barley and sorghum in the world. The area under millet in the world

recorded to 36.15 million hectares with production of 28.52 million tonnes and the yield is 811 kg per hectare. About 60 per cent of the world millet is produced in Africa. Asian countries occupy 36 per cent of the world millet area. European countries cover 4 per cent of millet area and 1 per cent is in North America. In case of production, the developing countries in Asia and Africa contribute around 93 per cent of total millet production in the world. Asia alone contributes 43 percent of the world millet production. European countries produce 6 per cent and 1 per cent is in North America. Per capita food use of millet was 28,314 lakh tonnes, which accounted per capita food use of 4 kg/year in the world **(Source FAOSTAT-2019-2020)**. The major pearl millet producing countries are in India, Nigeria, Niger, China, mali, Burkina Faso, Sudan, Ethopia, Chad and Senegal is on unique position.

National scenario on pearl millet cultivation

In India, pearl millet is introduced from Africa. India is the largest producer of pearl millet crop. The total area under pearl millet cultivation in India is 9.81 million hectares. The production of pearl millet is 9.24 million tonnes which stands the fourth after rice, wheat, maize and barley. Pearl millet possesses inherent capability to survive under extremely high temperature. Therefore, it is widely distributed in arid zone and semi-arid tropics. It occupies an area of 6.93 million ha with an average production of 8.61 million tonnes and productivity of 1243 kg/ha (**Directorate of Millets Development, 2020**).

The major pearl millet growing states are Rajasthan, Maharashtra, Uttar Pradesh, Gujrat and Haryana contributing 90% of total national production. Pearl millet cultivation is dispersed mainly during *Kharif* (rainy) season to the extent of 98.3 per cent across the country. It is also grown to a lesser extent during *Rabi* season in Andhra Pradesh, Karnataka, Tamilnadu and Punduchery. Summer pearl millet is popular in Gujarat state with very high yield exceeding 2.03 tonnes per hectare with excellent grain quality. It is also grown during summer season in Maharashtra, Rajasthan, Uttar Pradesh and Peninsular India for grain purpose and also in Punjab, Rajasthan and Uttar Pradesh for fodder purpose. Pearl millet is a high energy, nutritious food especially recommended for children, convalescent and elderly. It is also a rich source of iron and protein and consumed in the form of

porridge or pancake (like bread). The area under pearl millet in the world is 27 million ha with production of 36 million tons (**Source: - http://vasat-icrisat.org)** and the area under pearl millet in India in 2019-2020 was 8.69 million ha with production 10.5 million tones and the productivity of 1156 kg/ha.(**Source:-Directorate of Economic & Statistics, Department of Agriculture & Co-operation)**. Pearl millet is an important food grain crop of India and ranks fourth in acreage after rice, wheat, sorghum and maize. Among pearl millet producing states in the country, Gujarat State ranks first and accounts for about 11 per cent of the total area and 23 per cent of the production of the crop in the country.

State Scenario of pearl millet cultivation

Maharashtra state is the third largest in area and second in respect of production under pearl millet. In the state, one third of the cultivated area is under almost drought prone and famine hunted. This region receives scanty rainfall, which is having unpredictable and extremely variable in which pearl millet is grown extensively stable food crop which has ability to with stand the adverse condition. The pearl millet is primarily crop of dry land area, where it is taken on residual moisture. In Maharashtra Nasik, Ahmadnagar, Pune, Beed, Satara, Sangli, Solapur, Dhule and Jalgaon are the important pearl milet growing districts. Pearl millet crop is generally grown under rainfed condition in the district. The area under pearl millet cultivation in Maharashtra is 6824.914 ha, 4983.136 tonnes and productivity 730.139 kg /ha in the year of 2019-20(**Source**: **Directorate of Economics and Statistics**). Maharashtra ranks third largest in area and second in production of pearl millet. In productivity Maharashtra stands seventh rank and shares 15.3% of growing in India. The area, production and productivity of pearl millet was 108.75 lakh tonnes and 958 kg/ha, respectively in Maharashtra state during 2019-20 **(Source:-Indian journal of Agricultural Marketing)**. Under the thrust area, identified by the Indian Government, cultivation of pearl millet is given due importance.

District Scenario of pearl millet cultivation

In Beed District the area under pearl millet crop is 634.00 ha, with production of 761.72 metric tonnes and productivity of 12.50 quintal per hectare in 2019-20 (**Source : NARP and District Agriculture Office, Beed .2019-20**).

Ultimately area under pearl millet is expected to increase and it would be possible to bring low fertile land of drought prone area which is large in proportion, can be brought under pearl millet cultivation in addition to the present area. The increased demand may lead increase in prices of pearl millet and the farmers may be benefited. The need was felt to answer certain queries such as profitability, resources and marketing in pearl millet production. Keeping in view the above aspects, the present study has been undertaken with following objectives.

OBJECTIVES

1. To study socio-economic characteristics of pearl millet growers
2. To estimate cost and return of pearl millet crop
3. To workout marketing cost, marketing margin, marketing efficiency and price spread in different channels of pearl millet marketing
4. To know the constraints and opinions of pearl millet grower

HYPOTHESIS:

Pearl millet cultivation is profitable crop.

SCOPE:

Study will be helpful to economists and extension research to study the socio-economic characteristics of pearl millet growers. The analysis of cost of cultivation of pearl millet will be useful to arrive for finalization of minimum statutory price and state advised price. The study also helpful to research workers for conducting further research in this area.

Limitations:

1. The result of study was depend on collected data for only one agricultural year i.e. 2019-20.
2. The data collection was done by survey method only.
3. The collected data was related to Beed district only.

CHAPTER-II
REVIEW OF LITERATURE

CHAPTER- II

REVIEW OF LITERATURE

The review of past literature forms an integral part of any systematic research work. Moreover, it becomes imperative on the part of a research worker to have knowledge of research work carried out by previous researchers in the research area of interest. This requires that the research findings of previous studies closely related to a particular field of his research work from various sources. The knowledge obtained through such review of literature efforts enables him or her to gain insight in respect of a manner in which a given research problem has been understood, the nature of results obtained and the conclusions drawn. Many a times, it may be true and previous research work might have been carried out under different set of conditions.

Nevertheless, such knowledge is always useful for improving efficiency and effectiveness of all acts relating to designing of research problem, adopting suitable methodology and interpreting research results. In recognition of the importance of review of literature in research work, this chapter is devoted to present and discuss the reviews collected from various sources. For convenience, the reviews have been grouped under the following major headings.

2.1 Socio-economic characteristics

2.2 Costs and returns

2.3 Marketing cost, market margin, market efficiency and price spread

2.4 Constraints and suggestions

2.1 SOCIO-ECONOMIC CHARACTERISTICS

Adampurkar (1993) conducted study on Progress and prospects of irrigation water management in Maharashtra. It was revealed from socio-economic study of village Sarola (kh) in Pathri taluka of Parbhani district, that, the average size of family was 6 persons per family. The proportion of literate and illiterate persons was 26 per cent and 74 per cent respectively to the total population of village.

Adampurkar (1993) carried out worked on farm business analysis in Nanded district. It was observed that from his study that average family size was 6

members. Average male members were the highest i.e. 43.78 per cent, followed by female and children i.e. 30.66 per cent and 25.56 per cent, respectively. The average livestock position per farm was 6.54. The contribution of bullocks was 34.70 per cent, cows and buffaloes were 63.32 per cent and sheep and goat 1.98 per cent to the total livestock population. Average implements and power owned by the farmers were 7.95. The contribution of plough was 1.58, harrow 1.30, seed drill 1.26, hoe 1.68, bullock cart 1.06, sprayer1.30, thresher 0.18, tractors 0.13 and other 0.36. The farmers had invested Rs. 3250.13on building, Rs. 3856.64 on livestock and Rs. 3556.49 on implements and machinery.

Chitnis (2000) worked on that, the evaluation of on farm technologies and implementing constraints. He studied the socio-economic characteristics of respondents. The study found that equal percentage of respondents i.e. 30 per cent were found educated up to primary and secondary level followed by middle educated and illiterate, both 18 per cent respectively. Only 4 per cent were degree holders .While analyzing the composition of family, it was observed that majority of the respondents (59 per cent) were having 6.10 members in their families.

Naryanmoorthy (2000) carried out research on farmer's education and productivity of crops. The data were collected from Tamilnadu by simple random sampling technique. The study analyzed the role of farmers education in the productivity of crops using two seasons (i.e. Sambha and Thalandi seasons of Paddy) Data of 200 samples were collected. The bivariate analysis indicated that the use of yield increasing inputs was significantly higher among the higher educated (above 5 year of schooling) groups of ^farmers when compared to less educated groups of farmers (up to 5 yearn o schooling). The results of the study suggested that the role of farmer's education was by very limited or in significant in productivity of crop when fanners cultivate an uniform variety of a crop in a modem dynamic agricultural set up.

Mandal *et al*. (2005) conducted research on socio-economic profile of the farmers in saline irrigated environment. The study area was located in Agra and Mathura districts of Uttar Pradesh. A total 30 farmers were purposively selected from four villages namely Savi, Nagla, Hirdaya, Bhojpur and Karanpur. The data were collected during the years.2000-01 and 2003-04 from the sample farmers. The study notice that the education 6 level among the sample households remains almost

unchanged during the reference period. The average land holding was observed to be 1.36 hectares. The family size showed marginal increase during 2003-04 (6.3) as compared to 2000-01 (6.07), but the difference was not found to by statistically significant. The average annual income of the sample household was calculated to be Rs. 50,177. Rental value of land which reflects the actual profitability status of the agricultural operation and it was observed to be moderately high in case of normal land (Rs. 2500/ha and Rs. 3,375/ha during 2000-01 and 2003-04, respectively) as compared to rental land value under saline affected land (Rs. 2,250/ha and Rs. 3,000/ha during 2000-01 and 2003-04, respectively). This is a clear indication that fanning alone cannot fulfill the nominal needs of the households.

Asmatoddin *et al*. (2009) carried out study on socio-economic status and cropping pattern of medium farm owner in Marathwada region. The study was based on farm level Primary data was collected from 100 sample farms under assured rainfall zone in Marathwada region. It was observed that average family size was 06.00 persons in which male was 35.43 per cent followed by female 33.90 and children 30.67 per cent. In case of age 7.00 per cent farmers belonged to young group that is up to 30 years. The share of middle age group (31 to 50 years) was 52.00 per cent. In regards to educational status, most of the medium farmers were educated up to high school i.e. 47 per cent. In respect of occupational level of farmers, most of the farmers doing agriculture i.e. 83 per cent In case of soil type, majority of farmers had medium soil i.e. 62.00 per cent. With the consideration of above review, it was concluded that the average family size of the farmers was 06 persons.

Pagare *et al.* (2013) studid that land holding and cropping pattern of *rabi* jowar growers in marathwada region. Result showed that average total land holding for the sample as a whole was 03.71 ha. while with respect to small, medium and large farmers the size of land holding was 01.49, 03.32 and 06.32 ha. respectively. In general average size of land holding for irrigated and unirrigated as a whole was 01.52 and 02.18 ha. and general average size of uncultivated land was 00.18 ha. The net cultivated land was 03.50 ha. For small farmers, it was 01.44 ha, for medium, it was 03.01 ha and 06.13 ha, respectively. In case of cropping pattern on an average proportionate area under *rabi* jowar crop was 22.26 per cent. At overall level cropping intensity of *rabi* jowar farm was 147.00 per cent

Sabi *et al*.(2014) conducted research on socio-economic characteristics of farmer in wheat cultivation. Study was conducted in Dharwad district of Karnataka. 120 wheat growers were selected for study. Result indicated that, 58.33 per cent of respondents were found to be middle age category (31-50 years). About 22.51 per cent of the respondents belonged to old age category of (>50 years) and 19.16 per cent of the respondents belonged to young age category (18-30 years). 28.33 per cent of the respondents had high school education while, 13.33 per cent were illiterate. The other respondents were educated up to middle school (21.66%), PUC (17.52%), primary school (14.16%) and graduate (05%). The rural Social environment was the major cause for such trend. As the rural people are still traditional bound they generally do not prefer to send their children to colleges and they except their children to assist in farm and house hold activities

Singh *et al*. (2014) conducted the study on knowledge and attitude of farmer toward improved whet production technology in Bharatpur district of Rajasthan with a sample size of 300 small farmers as respondents. Result find that majority of farmers were middle aged ranging from 31 to 45 years age group and belonged to backward caste, half of the respondents were middle to higher secondary standard educated, majority of respondents were living in single type of family system and majority of them was not the member of any organization, Annual income was in the range of Rs. 30.0 to 60.0 thousand. Most of them were living in pacca house and engaged in agriculture. Majority of the respondents were running their farm operation with poor agricultural infrastructure facilities.

2.2 COSTS AND RETURNS

Satpute *et al*.(1990) carried out work on cost structure of *kharif* jowar in Marathwada region- the data used was for the year 1987-88. A sample of 150 cultivators was selected. The study indicated that the proportion of variable cost increased with the increase in size holding, while inverse trend was noticed in respect of fixed cost. On an In average in 12 total cost the contribution of variable and fixed cost was 61.98 per cent and 88.02 per cent, respectively. Amongst variable cost human and bullock labour, manures and fertilizers covered about 80 per cent share in total variable cost. Amongst fixed cost rental value of land and family labour constitutes 53.65 per cent and 26.04 per cent shares, respectively.

Suryawanshi (1991) conducted research on the resource use structure and allocation efficiency in pearl millet cultivation in Western Maharashtra. He worked out the cost of cultivation of local pearl millet according to size of holding. The per hectare total cost of cultivation was to the extent of Rs. 1116 out of the total cost. The Cost-A and Cost-B constituted 67.57 per cent and 85.90 per cent respectively. The most important item of expenditure was the charges of bullock labour which constituted 33.46 per cent followed by family and hired human labour. The next important item cost was imputed rental value of land, which was to the extent of 12.50 per cent of total cost. Among size groups of holding the per hectare total cost decreased with increase in the size of holding.

Gore (1999) studied comparative economics of *Rabi* sorghum (irrigated) and wheat in Solapur district. He observed the average cost of cultivation of *rabi* jowar was Rs. 8749.82 per hectare, Gross returns was Rs. 10871 per hectare, On an average, returns over cost-A, cost-B and cost-C were found to be Rs.5183, Rs.2728 and Rs.2122, respectively. On an average, per quintal cost of production was worked out to be Rs.566.33 in *Rabi* sorghum production and output-input ratio was 1.24.

Patil (2003) revealed that per hectare resource use was 65.14 man days human labour, 11-32 days bullock labour, 4.03 kg seed, 1.76 FYM and 46.30 fertilizers per hectare. Cost-A computed to Rs. 4683.0, Cost-B Rs. 687.26 and Cost-C Rs. 7640.90. The major item of the cost of cultivation was hired bullock labour 22.22 per cent followed by rental value of land 20.29 per cent. Per hectare net profit and at Cost-C were 1162.03, while per quintal cost was Rs. 588.06. The input - output ratio was 11.23.

Chahal and Kataria (2005) worked on the technology adoption and cost-return aspects of maize cultivation in Punjab. The study was entailed cross sectional survey of 300 maize growers in Jalandhar, Hoshiarpur and Patiala districts. The study revealed that total operational cost for hybrid varieties of maize (Rs.8.956/ha) was higher than that in 13 case of local (Rs.6,427/ha) and composite (Rs.8,009/ha) varieties of maize. Human and animal labour cost was 22.5 per cent in local, 15 per cent in Composite and 18.6 per cent in hybrid varieties of maize. As far

as expenditure on farm machinery was concerned it was significantly higher in case of hybrid varieties (Rs.747.98) as compared to traditional (Rs.48.5) and composite (Rs.801.88) varieties. Fertilizer accounted for 20 per cent of the operational cost in case of hybrid varieties, whereas the corresponding figures for traditional and composite varieties stood at 10.7 and 20.8 per cent, respectively. The maize yield in case of hybrid varieties (36.26 Q/ha) as expected higher than traditional (19.69 kg/ha). Both gross and net returns in case of hybrid maize (Rs. 19,637.48 and Rs. 10,681.65) were significantly higher than the other varieties.

Gurjar and Varghese (2005) carried out study on the structural changes over to time in cost of cultivation of major *rabi* crops in Rajasthan. The data were used for the period 1981-82 to 1999-2000. The structural changes in cost of cultivation of wheat in Rajasthan indicated that the total cost of cultivation of wheat has gone up from Rs. 3,321.60 out of the total increase of Rs. 14,285.97 in the cost of cultivation per hectare. The operational cost contributed about 63.57 per cent and the remaining 36.43 per cent by fixed cost items. Nearly, 22.11 per cent of the increase in total cost is accounted by the imputed value of family labour alone. Increase in the cost of machine labour shared. 11.17 per cent of the total increase in the cost of cultivation during the last nineteen years. The increase in fertilizer and irrigation changes has been to the tune of 6.04 per cent and 8.55 per cent, respectively of the total increase in cost of cultivation.

Dayakar *et al*. (2005) studied economics of sorghum cultivation in paddy fallows of Guntur district of Andhra Pradesh. They selected a sample of 100 sorghum farmers, covering 11 mandals which included 15 villages in Guntur district were surveyed. The data were collected for the year 2003-04. They revealed the returns from grain yield of *rabi* sorghum was Rs. 15226 per hectare with an average grain yield of 34.57 quintals per hectare. The net returns at paid-out cost (Cost-A) from paddy was Rs. 23885.3 per hectare and that of sorghum was Rs. 12444 per hectare. The net returns cost-A of Rs. 12444 per hectare from-sorghum cultivation is rationally high.

Kaur and Sekhon (2006) conducted the study on cost structure and rate of return in major paddy producing states of India. The data of cost of cultivation were collected for the year 1996-97. The study revealed that the highest cost of

cultivation was found in Andhra Pradesh i.e. Rs. 20937 per hectare as compared to Rs. 17966 in Punjab, Rs. 16929 in West Bengal and Rs. 11300 in Uttar Pradesh. The operational cost was highest in Andhra Pradesh which was Rs. 13514/hectare followed by West Bengal (Rs. 10890.37) and Punjab (Rs. 10194.66). The operational cost for Uttar Pradesh, Orissa and Madhya Pradesh was Rs.7044.55, Rs.6597.66 and Rs.6125.61, respectively. The major items of cost among operational cost was human labour. The expenditure on human labour was the lowest in Madhya Pradesh which was Rs.2873.08 per hectare whereas, for other states Punjab, Orissa and Uttar Pradesh it was Rs. 3407.69, Rs. 3893.63, Rs.3632.34, respectively. The human labour cost was the highest in Andhra Pradesh Rs. 7133.55 per hectare followed by West Bengal Rs. 6248.29 per hectare.

Tawale *et al*.(2009) worked on that cost and returns of rainfed and irrigated *rabi* jowar in Osmanabad district of Maharashtra. Results of the study showed that use of hired human labour, family human labour, machine labour and use of fertilizers were more in irrigated *rabi* jowar production than rainfed *rabi* jowar production. On the contrary, use of bullock labour and use of seed was more in rainfed *rabi* jowar production than in irrigated condition. Per hectare net profit of irrigated *rabi* jowar was Rs.2519.17 and by that of rainfed *rabi* jowar was Rs. 1470.00. The output-input ratio was 1.29 on irrigated *rabi* jowar and 1.14 on rainfed *rabi* jowar farms. In general, per quintal cost of production was Rs.680.33 on irrigated *rabi* jowar farm and Rs.649.92 on rainfed *rabi* jowar farm.

Karim *et al.* (2010) conducted study on economics of hybrid maize production in some selected areas of Bangladesh. The result found that about 33 and 28 per cent of the total variable cost was for human labour and chemical fertilizer, respectively. The average yield of hybrid maize was found higher than the national average. The average gross margin was observed to be Rs. 28456 on total variable cost basis. The cost per "kilogram of maize cultivation was Rs. 4.12 and returns from one kilogram of maize production was Rs. 7.80. It is found that the coefficient of human labour, land preparation, irrigation, urea and borax have significantly impact on gross return.

Pagare *et al*. (2013) carried out study on that cost and profitability of *rabi* jowar cultivation in Marathwada region of Maharashtra state. Result showed that

per hectare item wise cost and their proportion to cost C was Rs. 15294.21 on overall farmer's field. In context of profitability of *rabi* jowar, overall yield level was 15.52 quintal per hectore and in general gross income was Rs. 26968. It was also revealed that cost 'A', cost 'B' and cost 'C' decreased with increase in farm size and the input-output ratios increased with the increase in farm size.

Pagare *et al.* (2013) studied on energy utilization pattern by *rabi* jowar grower in Marathwada region of Maharashtra state. The result revealed that in case of energy utilization of overall *rabi* jowar, from ploughing to threshing, use of hired male labour was 16.30 man days, use of hired female labour was 24.17 women days. Total hired human labour required for *rabi* jowar grower was 28.29 man days. Use of family male labour was 9.77 man days; use of family female labour was 4.96 women days. In general, total family family human labour was 11.89 men days. Use of bullock labour 6.13 pair days and use of machine labour was 4.45 hrs.

Hile *et al.* (2013) conducted worked on the economics of production and marketing of *rabi* sorghum in western Maharashtra. The study was taken up in Solapur and Satara districts. Khandala, Phaltan and Man tahsils from Satara district and Madha, Mangalwedha and Mohol tahsils from Solapur district were selected for study. A sample of 15 *rabi* sorghum cultivators were randomly selected from each village. The study found that the major items of cost of-cultivation in *rabi* sorghum were rental value of land, hired human labour charges, bullock labour charges, family human labour, manure cost and machine power charges. The cost of cultivation decreased with increase in size group of holding. Benefit: cost ratio at overall level was greater than unity therefore, *rabi* sorghum was profitable enterprise.

Grover and Kumar (2013) studied that economics of production, processing and marketing of sorghum for fodder in Punjab. Sorghum is an important fodder crop during *kharif* season accounting for about one-fourth of the total fodder area in the 12 state. The total variable cost for sorghum has been found to be Rs. l1946/ha and more than 60 per cent of it is being accounted for human labour.

Sureshkumar *et al.* (2014) carried out study on that input use, cost structure, return and resource use efficiency in wheat production in south Gujarat. The result of study revealed that the average total cost of cultivation of wheat was Rs. 45784.31. It was the highest on large farms followed by Rs. 45720.79 on medium

farms and Rs. 39016.69 on small farms. Higher costs on large farms are associated with intensive use of Human labour, bullock labour, manures & fertilizers and irrigation charges. The average overall farm harvest price received by the wheat growers was Rs. 1552.79 per quintal. It varied from Rs. 1500.43 on small farms to Rs. 1597.43 on large farms. The average net profit per hectare over (Cost-C) was Rs. 20017.55 and it increased with the increase in size of farms. The overall input-output ratio was 1:1.44 on the basis of total cost of cultivation. It was the highest (1: 1.48) on large farms, followed by medium farms (1:1.43) and small farms (1:1.35).

2.3 MARKETING COST, MARGIN, EFFICIENCY AND PRICE SPREAD

Deshmukh *et al*. (1997) conducted study on marketing of farm commodities in Western Maharashtra and observed that in nearby regulated market the per quintal marketing cost of *rabi* Sorghum and wheat were worked to Rs. 29.39 and Rs. 30.44 where as the per quintal marketing cost of these commodities in weekly market was below six rupees. It was observed that in total marketing cost of *rabi* Sorghum and wheat, the proportion of commission agents were 47.60 per cent and 43.86 per cent respectively.

Bansode (2002) analyzed the price spread of *rabi* sorghum in Latur district and found that the producer's share in the consumer's rupee was 78.96 per cent. The share of wholesaler and retailer in consumer rupee was 3.65 and 5.84 per cent respectively. The total expenses incurred by producer, wholesaler and retailer were 11.54 per cent of the total price paid by consumer.

Bansode (2002) identified two main marketing channels for *rabi* Sorghum grain. He also concluded that Packaging had major share (31 per cent) in total per quintal marketing cost of *rabi* Sorghum followed by commission (26 per cent). The producers share in consumer rupee for *rabi* Sorghum was found to be high (79 per cent) in Latur district of Maharashtra.

Chauhan and Chhabra (2005) analyzed that 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 has been 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 has revealed that farm-level marketable surplus

is comprised of 53.21 per cent of the total production. Producer —> Local trader —> WS/ CA —> Processor/ Consumer has been 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 has been estimated at 78.01 per cent in this channel.

Tawale *et al*. (2009) carried out study on marketing cost, marketing margin and price spread through different channels of *rabi* jowar in Osmanabad district of Maharashtra. Fifteen wholesalers and fifteen retailers were selected for the study. The data were pertained for the year 2005-2006. The results observed that price paid by consumer was Rs.853.63 per quintal in channel-I (P-C) in which the producer's share in consumer's rupee was 99.57 per cent. Price spread was found to be Rs.3.63. In channel-II (P-W-R-C) price paid by consumer was Rs. 1008.08 per quintal in which producer's share in consumer's rupee was 84.92 percent. Price spread found to be Rs. 152.08 per quintal. In regard to channel-in (P-PW-SW-R-C) price paid by consumer was Rs. 1085.91 per quintal in which producer's share in consumer's rupee was 79.15 per cent. Price was paid found to be Rs.226.41 per quintal.

Deshmukh *et al*. (2010) conducted study on Marketed surplus and price spread in case of pearl mille in the year 2008-09 in Beed district of Maharashtra. For the study, about 96 pearl millet growers were selected from Georai tehsil. Primary wholesalers and secondary wholesalers as well as retailers from Georai and Beed markets were selected to investigate the cost, margin and prices spread in pearl millet marketing. The results revealed that the farm size of pearl millet was 0.62 hectares at overall level while the production was 13.79 quintals. Price paid by consumer was highest as Rs.920 per quintal in Channel-III in which producers share in consumer's rupee was 66.21 per cent. In case of Channel-II, price paid by consumer was Rs.775 per quintal in which the producer's share in consumer's rupee was 77.80 per cent whereas in Channel-I (Producer - consumer), price paid by consumer was less as compared to Channel-II and Channel-III. It was Rs.599.00 per quintal in which producer's share in consumer's rupee was highest i.e. 97.66 per cent as compared to Channel-II and Channel-III. Net price received by producer was highest in Channel-III which was Rs.610.00 per quintal than that of Channel-II (Rs.603.00 per quintal)

and Channel-I (Rs.585 per quintal). Similarly, price spread was also highest in Channel-II which was Rs.311.28 followed by Rs.172.00 in Channel-II and Rs.14.00 in Channel-I. It was found that, the Channel-III was beneficial to both producer as well as intermediaries

Navadkar *et al*.(2012) carried out research on marketing cost, market margin and price spread in Ahmednagar district of Maharashtra state. Result showed that In the Channel-I, the marketing cost incurred during the selling of maize was worked out to Rs. 203.28 per quintal at the overall level. The major component of marketing cost was commission charges (50.66%) which is followed by expenditure on packaging charges (25.27%) and transport (19.68%). In the Channel-II, the marketing cost incurred during the sale of maize was worked out to Rs. 47.50. The major components of marketing cost were packing (84.63 %) and transportation charges (10.74 %). The producer's share in consumer's rupee was 78.26 per cent and 73.19 per cent in Karjat and Ahmednagar market, respectively.

Hile *et al.* (2013) carried out worked on economics of production and marketing of *rabi* sorghum in western Maharashtra. Rhandala, Phaltan and Man tahsils from Satara district and Madha, Mangalwedha and Mohol tahsils from Solapur district were selected for study. A sample of 15 *rabi* sorghum cultivators were randomly selected from each village. The result showed that the items of marketing cost such as commission, transport and packing charges were most important items which accounted for 59.35 per cent, 29.39 per cent and 5.88 per cent, respectively. At overall level price spread in *rabi* sorghum was Rs. 524.44 and net price received by the producer was Rs. 2226.44.

Sharma *et al*. (2013) conducted the study on marketing efficiency and price spread of pearl millet in Rajasthan. Jodhpur and Nagaur were selected for the purpose of studying marketing cost incurred and margins earned by various intermediaries in marketing of pearl millet. Information regarding marketed surplus, price received and cost incurred in marketing was collected and price spread across different value chains was analyzed. In most of the markets, producer’s share in consumer rupee was highest in Channel II followed by Channel I and it was lowest in Channel III.

Dillibahadur *et al*. (2015) conducted worked on maize seed marketing chain and marketing efficiency in Nepal. Result concluded that, five major maize seed marketing chain I involved producers, collectors, wholesalers, retailers and consumers; Chain II involved producers, collectors, wholesalers and consumers; Chain III involved producers, collectors, retailers and consumers; Chain IV involved producers, collectors and consumers; and Chain V involved producers and consumers. A total of 64.3 tons of improved maize seed was marketed through the identified chains. Chain II was the most important supply chain, accounting for 38.8 per cent of total marketed seeds; while Chain I was the least important, accounting for 4.3 per cent. Producers' share in consumer price was highest in Chain V (100 per cent) and lowest in Chain III (66 per cent). Transportation cost accounted for the highest amount (average 47.5 per cent). Highest margin of profit (Rs 6.5/kg) was taken by retailers and lowest by collectors (Rs 2.5/kg).

2.4 CONSTRAINTS AND OPINIONS

Kunnal *et al*. (1984) in their study of adoption of new technologies in dry land sorghum crop production found that high price of fertilizers, diversion of fertilizers to irrigated plots, fear of heavy loss in case of crop failure, high cost of chemicals and lack of knowledge were some of the main reasons for non-adoption of dry land technology and less production.

Suryawanshi and Gaikwad (1984) studied- potential yield in *rabi* jowar production and analyzed that yield gap in *rabi* jowar production in Ahmednagar district. The gap was observed due to non-adoption of improved verities, low seed rate, inadequate labour and high prices of fertilizers and non-availability of plant protection chemicals.

Sagar and Singh (1988) carrird out study on an analysis of pearl millet growth of India. The study found that, from a level of 51 million tonnes in 1951-52, the country has produced 151.4 MT of food grain in year 1983-84. Pearl millet was major crop of rainfed areas after the cash crops, yet it has contributed only 4% to the total grain production. There were individuals state problems for low production but on an overall assessment, some are the major area under the crop planted with low yielding non-descript varieties due to non-availability of adequate quantities of seed of hybrids or high yielding varieties in the major pearl millet growing areas in time as

also high-cost-of hybrid seeds. Due to high cost of fertilizers, hardly any fertilizers is applied. Also due to non-adoption of recommended package of practices, there was poor plant population per unit area. There was improper growth of crop due to low initial soil moisture due to damage to young seedlings by heavy rains. Farmers have to sow pearl millet crop two to three times, yet the proper stand of the crop hardly establishes. There was general lack of awareness about plant protection measures. For these constrains there is need for regional planning for introduction and popularization of location specific technology for increasing yield, management of rain water during the crop growth period, effective weed control, application of fertilizer, ensure healthy plant population by filling the gaps by transplantation.

Murty (1992) conducted study on sorghum production and utilization in India. Sorghum production in India has shown a significant compound growth rate. The main component for this phenomenal growth rate came from the *kharif* season where the average yield had crossed the one tone mark especially in Maharashtra. Research constraints were mainly head molds, lower fodder quality and quantity and decreasing demand for grain in *kharif* lower levels of resistance of shoot fly, drought and charcoal rot, lower fodder yield and grain quality in *rabi*. To overcome these problems the hybrid varieties developed in the national programme possess the maximum level of resistance to head, molds, high yielding hybrids and varieties could establish in 17 assured moisture belt in Maharashtra, to encourage the industry to utilize whether *kharif* sorghum as a raw material, management of insects and diseases.

Godarao *et al.* (1993) studied constraints in pearl millet production under rainfed conditions. Results were reported from a study of the constraints encountered by a sample of 100 pearl millet growing farmers in the rainfed tract of Bhiwani and Hissar district, Haryana, India, this included high prices and non-availability of inputs and lack of marketing knowledge.

Singh and Sharma (1995) carried out the research on farmers perception of constraints in rice, wheat cropping system in Haryana. The-study was conducted-in -four villages viz., Shahpur and Sagga from Kamal and Gumthala Gadu and Jyotisar from Kurukshretra district and 100 farmers were selected randomly for study. The major constraints in rice-wheat cropping system were found to be the preparation of land (57.00 per cent), demand for advance payment by labour which

was difficult to meet (88.00 per cent), high wage rates of labour during peak season (79.00 per cent) lack of electric power for running tube wells during the crop season (97.00 per cent), frequent fluctuations in power supply (95.00 per cent), tension all of the year round in repayment of loan (91.00 per cent), lack of delivery system for supply of HYVs seed in villages (96 per cent), exorbitant cost of chemicals (92 per cent), lack of delivery system for supply of inputs in villages (91 per cent) etc. The recommendations from these areas were provision of farm machinery and implements, the facilities for crop loan through Panchayat be provided, farmers should prepare a crop plan with their resources, promoting interaction between the farmers and farm management experts.

Anonymous (1999) conducted worked on the major constraints experienced by farmers in taking up grain/dual purpose sorghum cultivation. Lack of availability of quality seed of HYV in time and in required quantity, lack of knowledge and awareness of newly released cultivars and its technology, high cost of labour during harvest, lack of ability to take risk in cultivation of HYVs, low remunerative sorghum production than high value oilseed and pulse crop is responsible for less preference for sorghum cultivation. The sorghum growers wanted to regular supply of quality seed of the improved single and multi cut fodder, transfer of technical information. The promotional and seed 1.18 supply activities in sorghum fodder production by various agencies, engaging outside labour for fodder sorghum production. Majority of the farmers have low land holdings which are used for cultivation competing commercial crops.

Gill and Turton (2001) carried out research on the constraints on improvement in pearl millet crop. The study observed that the problem of poor soil fertility and unreliable rainfall have been mentioned several times as major constraints. Labour scarcity during planting season could be a major constraint. Male migration and growing level of school enrolment means that the burden of labour supply is often thrown on to women, whose time is already severely constraint. In India, the greatest constraint on pearl millet HYV adoption in the least favored areas that can be addressed is lack of reliable supply of quality seed of adapted improved cultivars. In the less favored areas like Rajasthan and mostly Western Rajasthan

weakness of organized seed markets is one of the main reason for the low level of uptake of improved pearl millet cultivars. The above study revealed that the major constraints found in *Rabi* sorghum production were low yield, high rates of fertilizers, non-availability of labour in time, low market price and non-control of weed.

Tawale *et al*. (2009) carried out study on constraints and suggestion of rained and irrigated *rabi* jowar producers in Osmanabad. The results concluded that irregular supply of electricity (81.25 per cent), high rate of fertilizers (79.17 per cent), difficulties in control of weed (79.14 per cent), lack of rainfall (72.92 per cent), non-availability of labour in time (70.08 per cent), and low rate of jowar in market (60.42per cent) were the major constraints faced by *rabi* jowar growers. Regarding suggestions they suggested the provision of training with regard to disease control (79.17 per cent) and provision of low rate of fertilizers with availability at village level (75.00 per cent).

Navadkar *et al*. (2012) studied on yield gap analysis of *rabi* food grain crops and constrains in cultivation of jowar, wheat and gram in Solapur district of Maharashtra, *rabi* crop growers were faced constraints in cultivation of *rabi* crops such as lack of credit availability, lack of irrigation facilities, labour management, low availability of improved varieties, high cost of fertilizers, irregular power supply and inadequacy of labour at required time.

Paswan and Sinha (2014) conducted study on that constraints faced by wheat growers in adoption of wheat production technology. The constraints which were most perceived by the wheat growers were non-availability of production inputs at village level, lack of easily available credits, fragmentation of land holding, lack of soil testing facilities at nearby place and high cost of diesel.

CHAPTER-III

MATERIALS AND METHODS

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MATERIALS AND METHODS

Methodology of any scientific investigation is to draw the useful conclusion in the light of objectives of the study. To obtain the meaningful conclusion, it is essential to follow appropriate methodology and analytical techniques. This chapter deals with salient features of Beed district and methodology adopted for the present study. This includes plan of investigation with special reference to the selection of the study area, selection of sample, collection of data and analytical procedure to obtain meaningful conclusion relating to the objectives. Various cost concepts, terms and evaluation of items are also explained in this chapter.

3.1 SALIENT FEATURES OF BEED DISTRICT

Salient features consists the location, soil, climate, population and cropping pattern of district where the study has undertaken.

3.1.1 Location

Beed district is located at West-central part of Aurangabad region. It lies between 18^0-28'to 19^0-28' North latitude and 74^0-54' to 76^0-57'East latitude. Beed district is bounded on the North side by Jalna and Aurangabad district, on the East by Latur and Parbhani district, on the South side by Ahmenagar and Osmanabad district while on West side by Ahmedanagar district of Maharashtra state. Beed district is located on the Deccan platue of Maharashtra. Balaghat hills divides the district in two parts, one at North side known as 'Gangathadi' having gental slope while another is indulating hilly area known as 'Balaghat'. Balaghat region is having height of 2000-2200 feet from sea level. The district has 11 tehsils viz Ambajogai, Ashti, Beed, Dharur, Georai, Kaij, Majalgaon, Parali, Patoda, Shirur and Wadwani. The district has 1376 villages and 1090 Gram panchyats.

1.1.2 Soils

Most of the Beed district has a thin layer soil. The tehsils along the bank of river Godavari has a deep black soil which is good for crop production, The Godavari is the main river in the district and the Manjra, the Sindaphana, the

Bindusara and the Waan are the rivers in the district. Most of the rivers are dry in summer season. In the district out of total geographical area 2.39 per cent is covered with forest. In the Beed district well and tube well are the main source of irrigation. Majalgaon and Manjra dams and other 10 dams are also available for irrigation.

1.1.3 Climate

In the Beed district rainy season starts from middle of June and lasts till end of October. It is followed by winter season from November to February and summer season from March to June. The average temperature in summer was 35.5^0C. December is the coldest month of the year with average minimum daily temperature is about 16^0C and from March onwards it begins to increase rapidly. In Beed district distribution of rainfall is uneven as a result district come under drought prone area. The average rainfall in the district during 2020 was 627.6 mm.

1.1.4 Population

In the Beed district 11 tehsils viz Ashti, Ambajogai, Beed, Dharur, Georai, Kaij, Majalgaon, Parali, Patoda, Shirur, and Wadwani , 1376 villages and 1030 Gram-Panchayats. Total geographical area is 10693 sq. km. which is 3.47 per cent of total state area. In the district out of total geographical area 41.24 sq. km area is urban while 10651 sq.km area is in rural. According to 2011 census the total population of district was 25.88 lakh out of which 13.52 lakh are males and 12.33 lakh are females which contributes 2.36 per cent of state population. The sex ratio works out to 912 females per 1000 males. The literacy percentage was 73.53 per cent in which male literacy was 83.99 percent and female literacy was 62.29 per cent. The population density according to 2011 census was 242 people per sq.km. Out of total population 80.10 per cent was in rural area while 19.90 per cent was in urban area.

1.1.5 Cropping pattern

In Beed district, the total geographical area is 10693 sq.km and cultivated area is 9826 sq.km. *Kharif* and *Rabi* are two main seasons in Beed district for crop production, in *kharif* season hybrid jowar, bajra, tur, black gram, cotton groundnut and vegetables are the main crops while in *rabi* season wheat, chickpea, *rabi* jowar, safflower, maize, mustard, turmeric, vegetables and sugarcane are the main crops cultivated in district. The district also cultivate mango, mandarin, pomegranate, lemon, ber, banana as fruit crop.

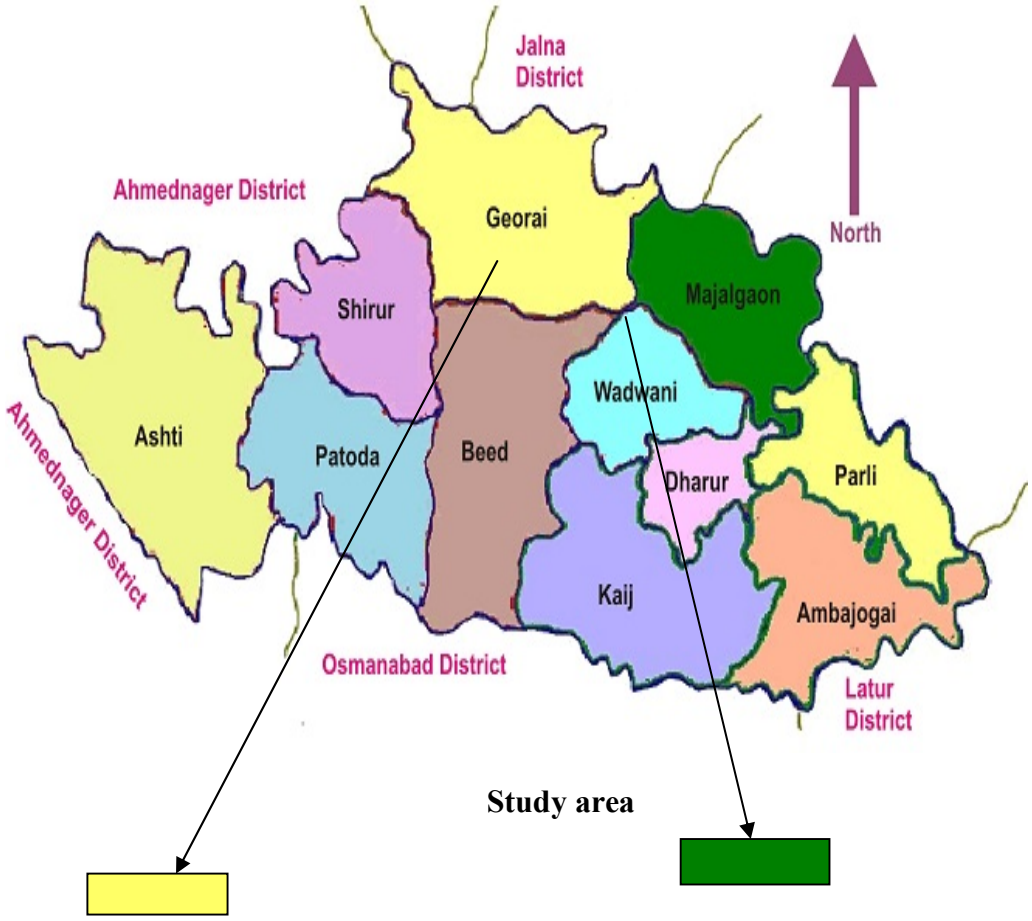

Fig 3.1: Map of Beed district of Maharashtra

3.2 SAMPLING DESIGN

The multistage sampling design was used for selection of district,

Sr. No.	Name of Taluka	Area ('00' Ha)	Production ('00' MT)	Productivity (Kg/ha)

tehsils, villages and pearl millet growers. In all 90 pearl millet growers were selected to collect the data on production, cost, returns, marketing channel, marketing cost, etc. The data were collected for the year 2019-20.

3.2.1 Selection of district:

In the first stage Beed district was purposely selected for the present study, since it ranks first in area and production of in Marathwada region of Maharashtra.

Table 3.1: Disrict wise area under pearl millet in Marathwada region of Maharashtra (2019-20)

Sr. No	District	Area (ha)	Production (Tonnes)	Productivity(kg /ha)
1	Aurangabad	314.420	291.672	927.650
2	Jalna	169.639	210.352	1240.000
3	**Beed**	**644.990**	**483.330**	**749.360**
4	Latur	4.790	1.230	256.700
5	Osmanabad	48.770	8.401	172.250
6	Parbhani	6.040	2.682	444.000
7	Hingoli	0.60	0.007	44.000

(Source: Directorate of Economics and Statistics 2019-20)

3.2.2 Selection of tehsils:

In second stage, two tehsils Georai and Majalgaon from Beed district were selected on the basis of more area under the pearl millet production and convenience to researcher under the situation of pandemic COVID-19, in the dark collection year Jan- Feb 2020 on words.

Table 3.2 Taluka wise Area, Production and Productivity of pearl millet Crop In Beed district (2019-20)

	1	Beed	133.37	137	1030
	2	Patoda	39.01	37	951
	3	Ashti	159.25	81	510
	4	Shirur	80.01	98	1231
	5	**Majalgaon**	**23.28**	**16**	**706**
	6	**Georai**	**76.31**	**41**	**533**
	7	Dharur	45.88	40	866
	8	Wadvani	39.38	23	585
	9	Ambajogai	11.66	7	619
	10	Kaij	24.87	16	648
	11	Parali	11.97	6	470

(Source: District Agriculture Office, Beed 2019-20)

3.2.3 Selection of villages:

In the third stage, three villages viz. Takarwan, Jategaon and Thakarwadi were selected from Georai tehsil; similarly Payatalwadi, Savargaon and Waghora were selected from Majalgaon tehsil randomly. These all 6 villages were considered. Thus six villages were selected from two tahsils for the present study.

3.2.4 Selection of pearl millet growers:

In the fourth stage 15 pearl millet growers were randomly selected from each selected villages. Thus from 6 villages, 90 pearl millet growers were selected.

3.2.5 Collection of data:

The sample farmers were interviewed personally and the objectives of the study were explained to ensure the co-operation. The information was collected from them in a specially designed pre-tested schedule by survey method. The schedule covering details of socio-economic characteristics of pearl millet growers, cropping pattern, physical input, cost incurred on various items of expenditure and return obtained from the crop for the year 2019-20. Further, data were analyzed with respect to objective of the study.

3.2.6 Sample of market intermediaries:

Georai market was purposively selected on the basis of arrivals in the market. From the market area, wholesalers and retailers were selected for the study of

marketing of pearl millet. Fifteen sample size of each intermediary was selected for present study.

3.3 ANALYTICAL TECHNIQUES

For present study to achive the objectives the descriptive statistical tools are used as per the objective of the study**.**

3.3.1 Socio-economic characteristics of pearl millet growers

In analytical technique, the first objective i.e. to study socio- economic characteristics of pearl millet growers was achieved by tabular analysis technique.

3.3.2 Cost and return in pearl millet production

Second objective i.e. cost and return in pearl millet production was achieved by application of standard cost concepts viz. cost-A, cost-B and cost-C, in tabular analysis. It is comprised of percentage, output input ratio and arithmetic mean.

3.3.3 Marketing channels, marketing efficiency and price spread in pearl millet marketing.

Third objective i.e. marketing channels, marketing efficiency and price spread of pearl millet marketing was achieved by tabular analysis technique.

3.3.4 Constraint and suggestions

Constraint and suggestions of pearl millet grower were achieved by applying frequency and percentage method.

3.4 TERMS AND CONCEPTS USED

3.4.1. Cost concept

In present study the cost of pearl millet was worked out by using the standard cost concepts such as cost-A, cost-B and cost-C.

a) **Cost-A**

It includes the item namely hired human labour, bullock labour, machine labour, seed, manures, fertilizers, crop protection, land revenue, incidental charges, depreciation on assets and interest on working capital.

b) **Cost-B**

It includes the cost-A plus rental value of land and interest on fixed capital.

c) Cost-C

It includes the cost-B plus imputed value of family human labour.

3.4.2 Marketing channels, marketing efficiency and price spread concept

a) Marketing cost and marketing margins

Marketing cost and market margin was calculated by actual data collected from the market intermediaries; cost of marketing incurred by producer is calculated by data collected from selected producers for the present study. Cost of marketing comprise loading, unloading, transportation charges, weighing charges, commission charges, labour packaging, market fee etc, and calculated by using following formula

$$C=C_f+C_{m1}+C_{m2}+C_{m3}+\ldots..+C_{mn}$$

Where,

C = Total cost of marketing of the commodity.

C_f = Cost paid by the producer from the time the produce leaves the farm till its selling.

C_{mi} = Cost incurred by the $_{ith}$ middleman in the process of buying and selling of pearl millet.

It refers to the difference between price paid by the consumer and price received by the producer. In a sense, the marketing margin is the price of all utility addition activities and function performed by marketing functionaries. This price includes the expenses of agencies performing marketing function and also their profit.

$$MT=\sum_{i=0}^{n}\frac{(Si-Pi)}{Qi}$$

Where,

MT= Total marketing margin

S_i= Sale value of the product for $_{ith}$ firm

P_i= Purchase value of the product paid by the $_{ith}$ firm

Q_i= Quantity of the product handled by $_{ith}$ firm

I= 1, 2...n (number of firm involved in the marketing channel).

b) Marketing channel

Various agencies perform the different marketing functions in the chain to transfer the produce from the place of production to the consumer. Pathway or route by which the produce transfer from producer to consumer is called marketing channel.

Following marketing channels taken for present study.

Channel-I : Producer-Consumer

Channel-II : Producer – Retailer - Consumer

Channel-III : Producer – Wholesaler -Retailer – Consumer

1) Wholesaler

Wholesaler is an intermediary who work as wholesaler in the marketing of pearl millet. He buy produce on a large scale from village trader and retailer.

2) Retailer

Retailer is concerned with buying the produce from wholesaler or producer and sale to consumer.

c) Price spread

It is the difference between the price paid by consumer and price received by producer. Producers share in consumer's rupees (PS) is expressed as follows.

Price spread = Consumer price – price received by farmer

$P_s = C_f - P_f$

Where,

C_f= Consumers price

P_f= Price received by farmer

d) Producers share in consumer's rupee

It is the ratio of net price received by producer to the price paid by consumer and can be calculated as:

$$PS = \frac{\text{Net price received by the producer}}{\text{Price paid by the consumer}} \times 100$$

e) Marketing Efficiency

The marketing efficiency of the selected channels was studied with the help of shepherd's formula which is given below.

$$M.E = \frac{V}{I} - 1$$

Where,

ME = Index of marketing efficiency

V = Value of pearl millet

I= Total marketing cost

3.4.2 Measurement and evaluation of cost items

1. Hired human labour:

Hired human labour was measured in Man days. One man day consists of 8 hours. Labour cost was evaluated at the rate of Rs.300.00 per day for male and Rs.150.00 per day for female prevailing in the village. The female labour was converted into man day by multiplying to the number of female with 0.50.

2. Bullock labour:

Hired bullock labour charge was considered for 8 hours as a day, actually paid in the locality. For the study, hired bullock charge was Rs.400.00 per day for a bullock pair.

3. Machine labour:

Machine labour in case of owned machine was evaluated as per the hired charges prevailed in the village and in case of hired machine it was Rs.800.00 per hour.

4. Seed of pearl millet:

The actual price with expenditure incurred on procurement was taken into account for purchase of seed, the per kg cost was Rs 170.

5. Fertilizers:

Fertilizers in the form of Ammonium Phosphate sulphate were used and quantity of nitrogen and phosphorus was calculated in order to determine the actual, expenditure on nitrogen and phosphorus. The rate prevailing in the market for 20:20;0:13 and 10:26:26 was Rs. 21.11/kg and Rs. 26.44/kg respectively.

6. Plant protection:

It includes the actual cost incurred on purchase of insecticides, pesticides, fungicides and their procurement.

7. Land revenue:

The land revenue was considered which was actually paid by cultivators for crop area.

8. Incidental expenditure:

It includes minor repairs, refreshing charges and other expenditure for cultivation of the crop.

9. Interest on working capital:

The interest on working capital was worked out on cost-A (excluding depreciation and land revenue). It was calculated for full period of crop. The interest on working capital was calculated as 6 per cent per annum.

10. Depreciation on assets:

Depreciation means the monetary value of an asset decreases over time due to use, wear and tear or time obsolescence. This decrease is measured as depreciation. Straight-line method was used for calculating depreciation. The uniform rate of 10.00 per cent on the present value from the beginning of the year of farm

implements and machinery was taken and only the proportionate charges were taken for the crop on area basis.

11. Rental value of land:

Rental value of owned land was estimated at 1/6 of the gross value of produce minus land revenue.

12. Interest on fixed capital:

It was calculated by charging interest at the rate of 11.00 per cent on investment on commonly used assets like plough, harrow, seed drill, hoe, bullock cart, hand sprayer, machine sprayer and power sprayer.

14. Cropping intensity:

It is the ratio between of gross cropped area and net cultivated area expressed in percentage.

CHAPTER-IV

RESULTS AND DISCUSSION

CHAPTER- IV

RESULTS AND DISCUSSION

The data collected from the sample farmers were analyzed as per the methodology laid down in chapter III and the results of the study are presented and discussed in this chapter under following heads.

1. To study socio-economic characteristics of pearl millet growers
2. To estimate cost and return of pearl millet crop
3. To workout marketing cost, marketing margin, marketing efficiency and price spread in different channels of pearl millet marketing
4. To know the constraints and opinions of pearl millet grower

4.1 Socio-economic characteristics of pearl millet growers.

Socio-economic characteristics of pearl millet growers such as age, family size, education, land holding and livestock etc. were worked out and the results are presented in table 4.1. The result revealed that, 33.33 per cent millet growers comes under the age group of 25 to 40 years, 66.66 per cent comes under 40 to 55 years age group are respectively and 11.11 per cent fall under 55 and above age group. Education is another important factor influcing managerial and technical ability of any business. It was seen from Table 4.1 that, 42.22 per cent pearl millet growers were educated up to primary education, followed by 34.44 per cent have completed college level education and 23.33 per cent pearl millet growers were illiterate.

The family size is important factor for every farmers which gives the availability of family labour. It was revealed from table 4.1 that, 35.78 per cent were male, 32.60 percent were female and 33.77 percent were children. The average number of male, female and children were found to be 2.14, 1.95 and 2.02 respectively.It was also observed from table 4.1 that, most of the of pearl millet growers are engaged in farming sector. Out of 90 pearl millet growing respondents (66) 72.22 per cent were having farming as their main occupation, While (19) 20.00 per cent secondary and (5) 7.77 per cent tertiary occupation. Income size of land

holding it is observed from table 4.1, that, 6.66 percent pearl millet growers have land up to 2 ha, 92.22 percent pearl millet growers have land up to 2 to 4 ha and 1.11 percent pearl millet growers have land above 4 ha. Position of livestock was observed from the table 4.1 that, most of the pearl millet respondents use the bullock for farming, about 31.15 percent bullock used by average pearl millet growers. Also respondents have 34.89 percent cow, 33.95 percent buffalos.

Table 4.1: Socio-economic characteristics of pearl millet growers

Sr. No.	Particulars	Number (N=90)	Per cent
1.	**Age(Year)**		
	i) Young (25 to 40)	25	33.33
	ii) Middle (40 to 55)	60	66.66
	iii) Old (55 & above)	5	11.11
2.	**Education (In 3-Quantum number)**		
	i) Illiterate	21	23.33
	ii) Primary	38	42.22
	iii) College	31	34.44
3.	**Family size (No.)**		
	i) Male	2.14	35.78
	ii) Female	1.95	32.60
	iii) Children	2.02	33.77
4.	**Occupation (In 3-Quantum number)**		
	i) Primary	66	72.22
	ii) Secondary	19	20.00
	iii) Tertiary	5	7.77
5.	**Land holding (ha.)**		
	i) Small(≤2ha)	6	6.66
	ii) Medium(>2ha to ≤4ha)	83	92.22
	iii) Large(>4ha)	1	1.11
6.	**Livestock position (No.)**		
	i) Bullock pair	1.00	31.15
	ii) Cow	1.12	34.89
	iii) Buffalo	1.09	33.95
7.	**Investment on commonly used assets(Rs.)**	**10295.82**	—

4.2. Land use pattern:

The detail data related to size of land holding, gross cropped area, net cultivated area (in which rain fed and irrigated areas), double cultivated area and cropping intensity in relation to selected respondents were calculated and indicated in table 4.2. The average land holding was 2.66 in which out of this land holding the under irrigation was 38.34 per cent and rainfed area was faund 61.65 per cent. Net cultivated area was 100 percent while average gross cropped area was 3.95 and cropping intensity was 148.49 per cent.

4.3. Cropping pattern of pearl millet grower

The cropping pattern is the important factor influencing costs and returns on the farm. It also determines employment potential of farm as different crops required varying quantities of labour units. Table 4.2 gives an idea about area under different crops in different season on the pearl millet farm.

It is seen from Table 4.2 that gross cropped area on sample pearl millet farm was 3.95 ha. The cropping pattern of the sample farmer was dominated by *kharif* crops because 67.34 per cent of the total gross cropped area was covered by *kharif* crops. Among the different *kharif* crops, pearl millet was grown on 12.65 per cent area of gross cropped area followed by Cotton (41.26 per cent), Soybean (5.56 per cent), Red gram (0.08 per cent), Green gram (0.75 per cent) . During *rabi* season *rabi* jowar, wheat and chickpea were cultivated by the farmer. The area under their three *rabi* crops 16.70 per cent to gross cropped area .In summer season vegetables grown on 3.54 per cent. When area under different crops studied, it is found that Sugarcane was the major crop cultivated by pearl millet grower on 12.40 per cent area of gross cropped area. The net sown area 2.66 ha and double crop area 1.29 ha with cropping intensity was 148.49 per cent.

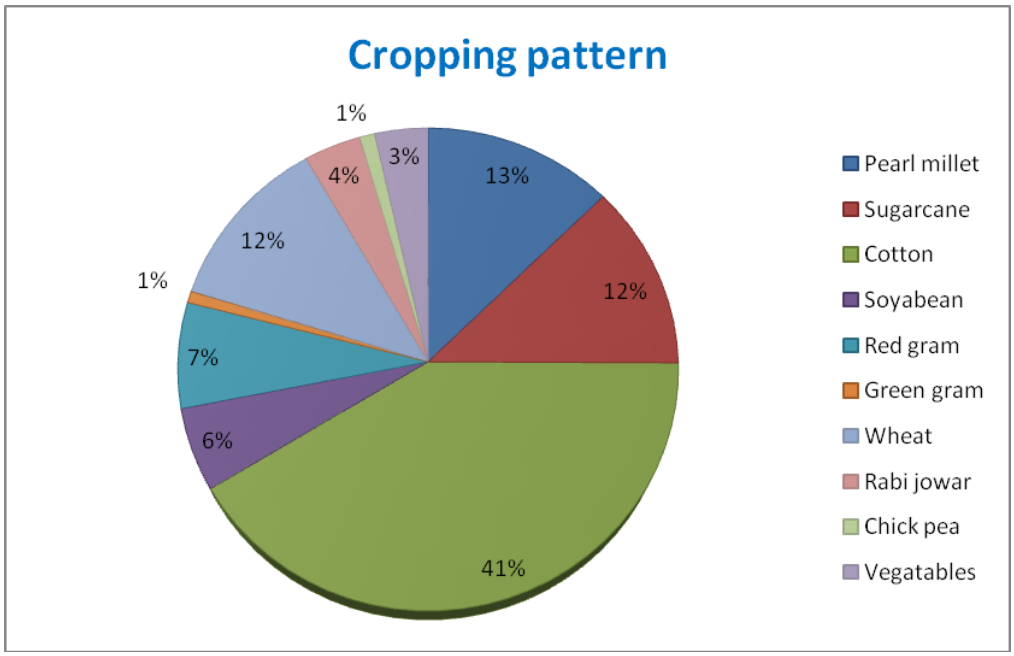

Fig 4.1: Cropping pattern of pearl millet growers to gross cropped area (3.95 ha)

Table 4.2: Per farm land use pattern of pearl millet growers

Sr. No	Particulars	Area (ha.)	Per cent
1.	Total area	2.90	---
2.	Net cultivated area	2.66	100
3.	Irrigated area	1.02	38.34
4.	Rain fed area	1.64	61.65
5.	Double cropped area	1.29	---
6.	Gross cropped area	3.95	---
7.	Cropping intensity	---	**148.49**

Table 4.3: Cropping pattern of pearl millet growers

Sr. No	Particulars	Area (ha)	Per cent
A.	***Kharif***		
	Pearl millet	0.50	12.65
	Cotton	1.63	41.26
	Soyabean	0.22	5.56
	Red gram	0.28	0.08
	Green gram	0.03	0.75
	Subtotal	**2.66**	**67.34**
B	***Rabi***		
	Rabi jawar	0.15	3.79
	Wheat	0.47	11.89
	Chick pea	0.04	1.01
	Subtotal	**0.66**	**16.70**
C	***Summer***		
	Vegetable	0.14	3.54
	Subtotal	**0.14**	**3.54**
D	**ANNUAL**		
	Sugarcane	0.49	12.40
	Subtotal	**0.49**	**12.40**
i.	**Gross cropped area**	**3.95**	**100**
ii.	**Double cropped area**	**1.29**	**32.65**
iii.	**Net cropped area**	**2.66**	**67.34**
iv.	**Cropping intensity**	**148.49**	**---**

4.4. COST AND RETURNS IN PEARL MILLET PRODUCTION:

Physical input can be transformed in production of pearl millet, the input can be converted into monetary terms to know the gross returns. With the help of cost and returns, profitability of pearl millet production can be determined as follows.

4.4.1. Operation wise labour requirement in pearl millet crop

Operation wise labour requirement in pearl millet crop production per hector was determined and indicated in table 4.4. The result showed that, in the operation of ploughing machine labour used were 1.26 i.e. 23.37 per cent and operation of harrowing machine labour used was 1.20 (22.26 per cent) respectively. For application of manure hired male labour, hired female labour,family male labour and family female labour used were2.04 (14.87 per cent), 1.32 (8.22 per cent) , 0.20 (7.14 per cent), 0.06 (1.42 per cent) respectively. In the operation of sowing family male labour used was 0.23 i.e. 8.21 per cent, bullock labour, hired male labour and family female labour were 1.03 (100 per cent), 3.54 (15.04 per cent) and 0.12 (2.84 per cent), respectively. In irrigation operation family male labour used was 1.17(41.78per cent) while hired male labour and hired female labour was 2.21 (15.22 per cent) and 0.07 (0.43 per cent) respectively. More hiredlabour was used for irrigation as compared to family labour. In the operation of fertilizing hired malelabour, hired female labour, family male labour and family female labour were 2.05 i.e. 14.11 per cent, 1.13 (7.04 per cent), 0.02 (0.47 per cent) and 0.02 (0.47 per cent) respectively. For wedding operation hired female labour 2.33 (14.51 per cent) and family female labour 3.13 (74.17 per cent).

In the operation of hoeing hired male labour, hired female labour and machine labour were 0.86 (5.92 per cent), 2.33 (14.51per cent) and 0.96 (17.81 per cent) respectively. For harvesting operation hired male labour, hired female labour, family male labour and family female labour used were in proportionate of 2.32 (15.97 per cent), 3.70 (23.05 per cent), 0.83 (29.64 per cent) and 0.42(9.95 per cent), respectively. In the operation of threshing hired male labour, hired female labour, family male labour, family female labour and machine labour used were 15 (10.33 per cent), 1.61 (10.03 per cent),0.35 (12.50 per cent), 0.47 (11.13 per cent) and 0.96 (17.81) per cent respectively.

Plate 4.1: Pearl millet farm at flowering and pollination stage

Plate 4.2: Pearl millet farm at grain filling stage

Table 4.4: Operation wise labour requirement in Pearl millet crop

Sr. No.	Particulars	Hired male labour	Hired female labour	Family male labour	Family female labour	Total Human Labour	Bullock Labour (hours)	Machine labour (hours)
1.	Ploughing	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.26 (23.37)
2.	Rotary	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.01 (18.73)
3.	Harrowing	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.20 (22.26)
4.	Manuring	2.04 (14.87)	1.32 (8.22)	0.20 (7.14)	0.06 (1.42)	3.32 (8.90)	0.00 (0.00)	0.00 (0.00)
5.	Sowing	3.54 (15.04)	3.56 (22.18)	0.23 (8.21)	0.12 (2.84)	7.45 (19.97)	1.03 (100)	0.00 (0.00)
7.	Weeding	0.00 (0.00)	2.33 (14.51)	0.00 (0.00)	3.13 (74.17)	5.46 (14.64)	0.00 (0.00)	0.00 (0.00)
8.	Fertilizer application	2.05 (14.11)	1.13 (7.04)	0.02 (0.47)	0.02 (0.47)	3.22 (8.63)	0.00 (0.00)	0.00 (0.00)
9.	Hoeing	0.86 (5.92)	2.33 (14.51)	0.00 (0.00)	0.00 (0.00)	3.19 (8.55)	0.00 (0.00)	0.96 (17.81)
10.	Irrigation	2.21 (15.22)	0.07 (0.43)	1.17 (41.78)	0.00 (0.00)	3.45 (10.53)	0.00 (0.00)	0.00 (0.00)
11.	Harvesting	2.32 (15.97)	3.70 (23.05)	0.83 (29.64)	0.42 (9.95)	7.27 (19.49)	0.00 (0.00)	0.00 (0.00)
12.	Threshing	1.50 (10.33)	1.61 (10.03)	0.35 (12.50)	0.47 (11.13)	3.93 (10.53)	0.00 (0.00)	0.96 (17.81)
	Total	**14.52 (100)**	**16.05 (100)**	**2.80 (100)**	**4.22 (100)**	**37.29 (100)**	**1.03 (100)**	**5.39 (100)**

4.5. Use of physical input and output in pearl millet cultivation

Pet hectare use of physical inputs for pearl millet cultivation and its output are given in Table 4.5. These physical inputs include hired human labour, bullock labour, machine labour, seed, manure and fertilizers. It was observed from the Table that 14.52 and 16.05 man days of hired human labour and family human labour were utilized for one ha pearl millet cultivation. Similarly 1.03 pair days and 5.39 hr of bullock labour and machine labour were used for per hectare pearl millet cultivation respectively. With the respect to seed, it is observed that 3.62 kg per ha seed was utilized in pearl millet cultivation. In case of manures and fertilizer it was seen that 11.12 q manures, 29.12 kg nitrogen, 14.42 kg phosphorus and 10.44 kg potassium were utilized per ha pearl millet cultivation.

With respect to per hectare output of pearl millet it was seen that the yield of main produce was 9.50 q and of by produce it was 9.00 q.

Table 4.5: Per hector physical input and output of pearl millet farm (Unit/ha.)

Sr. No.	Particulars	Unit	Average
	INPUT		
1.	Hired human labour	man day	
	Male		14.52
	Female		16.05
2.	Family human labour	man day	
	Male		2.80
	Female		4.22
3.	Bullock labour	pair day	1.03
4.	Machine labour	Hours	5.39
5.	Seed	Kg	3.62
6.	Manures	Q	11.12
7.	Fertilizer		
	N	Kg	29.12
	P	Kg	14.42
	K	Kg	10.44
	OUTPUT		
1.	Main produce	Q	9.50
2.	Byproduce	Q	9.00

4.6. Per hectare cost of cultivation of pearl millet

Per hectare cost of cultivation of pearl millet was estimated by using the standard cost concepts i.e. cost-A, cost-B and cost-C and presented in Table 4.4. It is observed from table that, per ha total cost of cultivation i.e cost- C of pearl millet cultivation was Rs.18067.03 out of which cost-A 12160.02 was (67.30 per cent) and cost-B was Rs.17047.03 (94.35 per cent). Among the different items of variable cost, cost required on hired human labour was maximum i.e.Rs.3400.02 (18.81 per cent), followed by machine labour Rs.1860.66 (10.29 per cent) and bullock labour Rs.1810.10 (10.01 per cent). The proportion of seed, manure, and fertilizer was Rs.581.83 (3.22 per cent), Rs.800.20 (4.42 per cent) and Rs.1538.33 (8.50 per cent) respectively. Among the various indirect costs rental value of land stood first i.e Rs.3458.20. (19.14 per cent) of cost C, followed by family human labour charges Rs.1010.00 (4.64 per cent), interest on working capital Rs.1330.04 (7.36 per cent), interest on fixed capital Rs.1428.81 (7.90 per cent) and depreciation on capital assets Rs.560.40 (3.10 per cent) respectively.

Plate 4.3: Operation of harvesting of pearl millet crop

Plate 4.4: Operation of threshing pearl millet crop

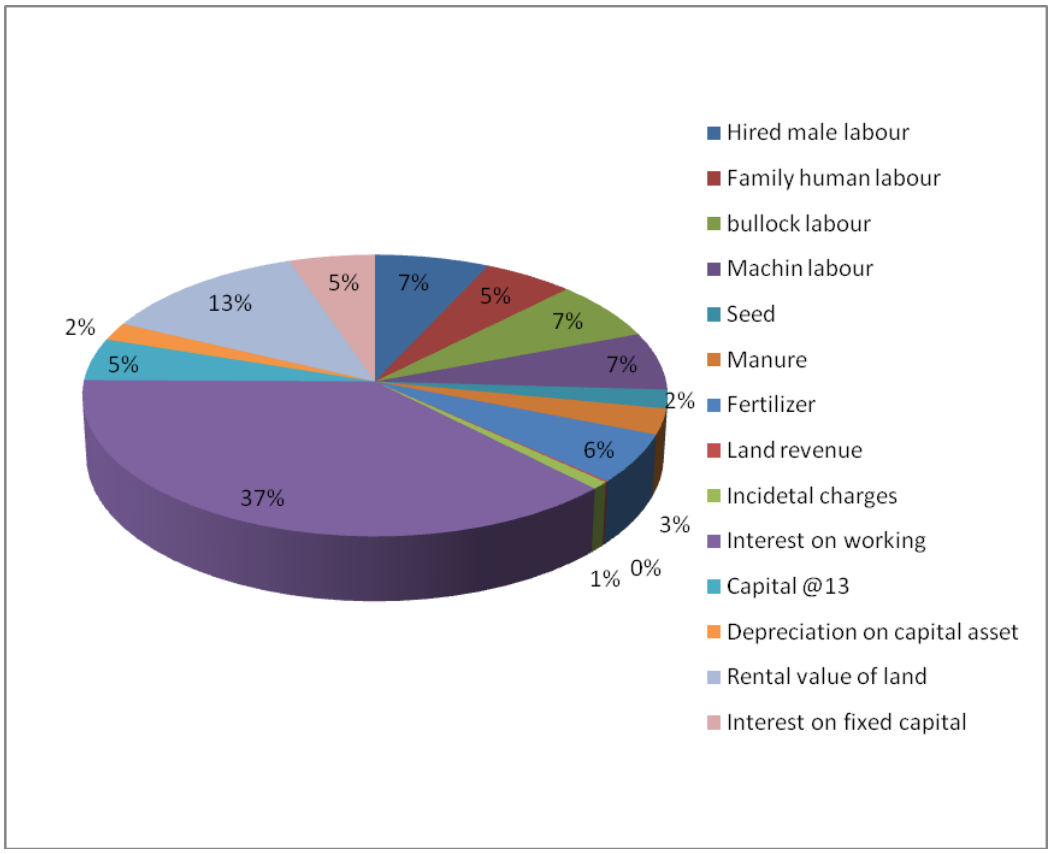

Fig.4.2: Percentage expenditure to Cost-C (Rs. 18067.03) in Pearl millet production

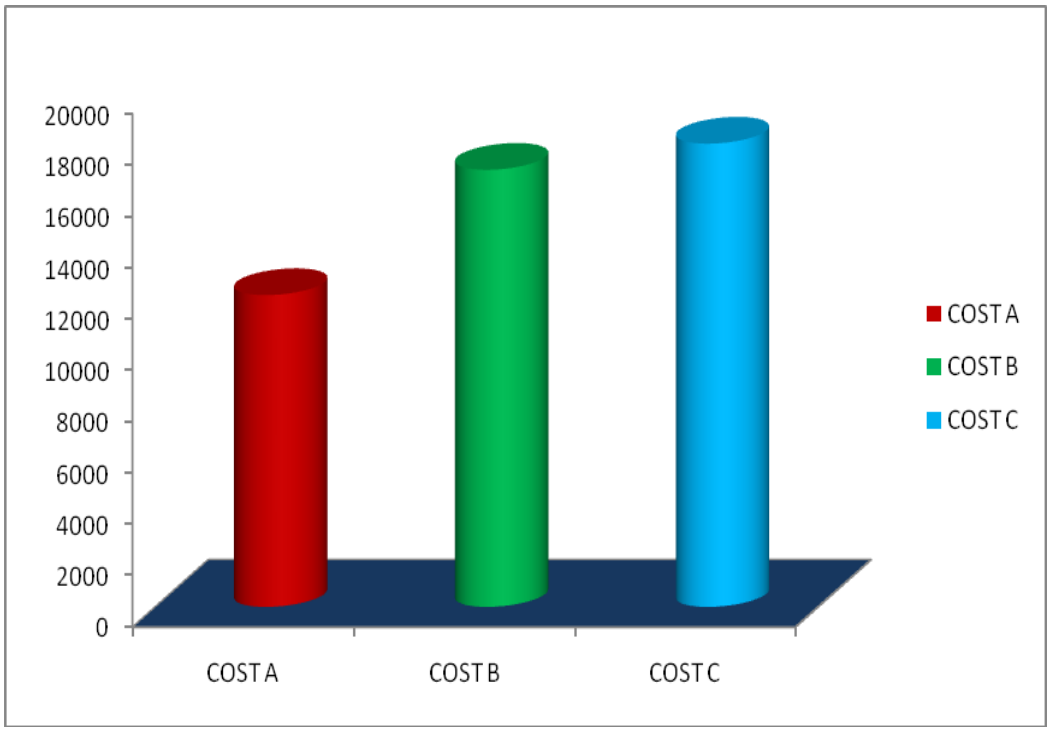

Fig.4.3: Per hectore cost of cultivation pearl millet crop

Table 4.6: Per hector cost of cultivation of pearl millet crop (Rs/ha.)

Sr. No.	Particulars	Amount	Per cent
1.	**Hired human labour**		
	Male	1900.00	10.51
	Female	1500.02	8.30
2.	Machine labour	1860.66	10.29
3.	Bullock labour	1810.10	10.01
4.	Seed	581.83	3.22
5.	Manure	800.20	4.42
6.	Fertilizer		
	N	650.33	3.59
	P	550.00	3.04
	K	338.00	1.87
	Sub total	**1538.33**	8.50
7.	Incidance charges	240.00	1.32
8.	Working capital	10231.14	56.62
9.	Interest on working capital @ 13%	1330.04	7.36
10.	Land revenue	38.00	0.21
11.	Depreciation @ 10 %	560.40	3.10
12.	**Cost-A (Σ 1 to12)**	**12160.02**	67.30
13.	Rental value of land	3458.20	19.14
14.	Interest on fixed capital @ 10%	1428.81	7.90
15.	**Cost-B (Σ 13 to16)**	**17047.03**	94.35
16.	Family labour		
	Male	510.00	2.82
	Female	510.00	2.82
17.	**Cost-C (Σ 16 to18)**	**18067.03**	**100**

4.7 Per hectare Profitability of pearl millet cultivation:

Per hectare profitability at various cost level i.e. measures of income were worked out and presented in Table 4.7. It is revealed from Table that gross return from pearl millet cultivation obtained were Rs. 22058.16, farm business income was worked out by deducting cost A from gross return and it was Rs. 9898.14. Family labour income was worked out by deducting cost B from gross return and it was arrived at Rs. 5011.13. Similarly net returns were worked out by deducting cost C from gross return and it was R. 3991.13. The benefit cost ratio was worked out to be 1.22. It indicates that pearl millet cultivation was marginally profitable activity. The yield levels are low due to irregularity of rain in last two to three years. The per quintal cost of cultivation was worked out Rs. 1602.50.

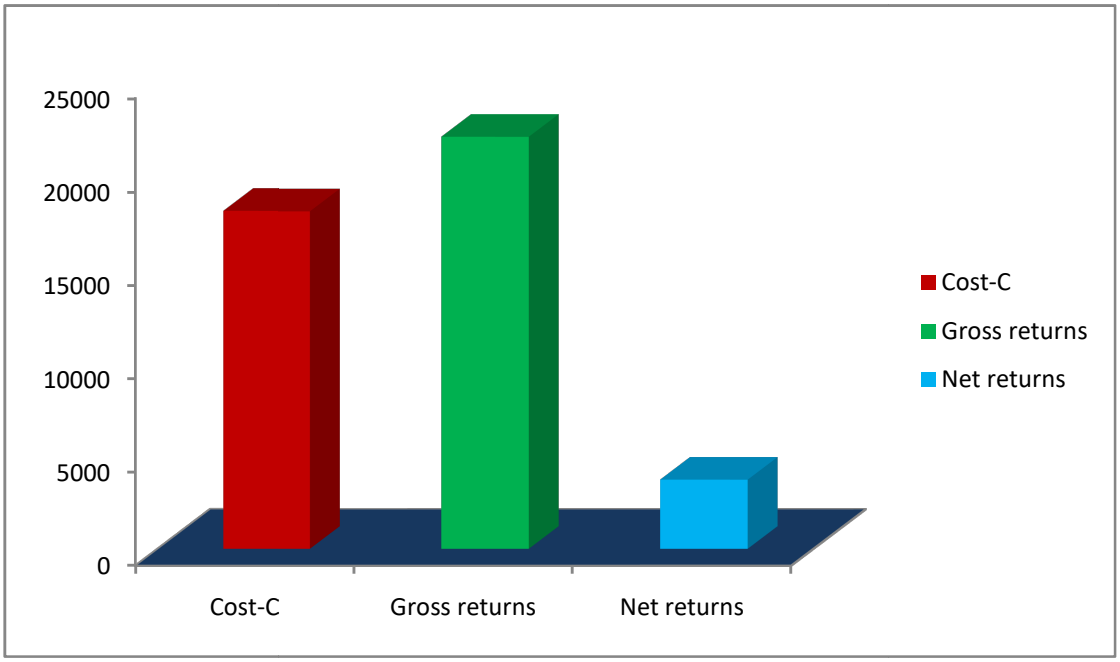

Fig. 4.4: Per hector profitability of pearl millet

Table 4.7: Per hector profitability of pearl millet crop (Rs/ha.)

Sr. No.	Particulars	Amount
1.	Returns from main produce (Grain)	19327.16
	Returns from by produce	2731.00
2.	Gross return (item 1+2)	22058.16
3.	Cost-A	12160.02
4.	Cost-B	17047.03
5.	Cost-C	18067.03
6.	**Farm business income** (Gross return minus Cost-A)	**9898.14**
7.	**Family labour income** (Gross return minus Cost –B)	**5011.13**
8.	**Net Profit** (Gross return minus Cost-C)	**3991.13**
9.	**Benefit- Cost ratio** (Gross return divided by Cost-C)	**1.22**
10.	**Per quintal cost of production** (Cost-C minus by produce value divided by main produce quantity)	**1602.50**

4.8. Per farm marketed surplus of Pearl millet

Per farm marketed surplus of pearl millet is shown in Table 4.8. It was found that average farm size of pearl millet was 0.50 ha, and production was 9.50 q. Out of which 11.70 per cent retained for family consumption and 88.21 per cent was marketed through different channels. In marketing of pearl millet three different channels were identified i.e.

1. Producer - Consumer

2. Producer - Retailer- Consumer

3. Producer-Wholesaler - Retailer - Consumer

Through channel I, 2.31 q produce was marketed which was 24.30 per cent of the total production Similarly, from channel II and III 3.32 q and 2.75 q, pearl millet were marketed which was 34.94 per cent and 28.94 per cent, respectively to the total production.

Table 4.8: Per farm marketed surplus of Pearl millet (q/farm)

Sr. No.	Particulars	Quantity	Percentage
1.	Pearl millet Field (ha)	0.50	_
2.	Pearl millet Production (q)	9.50	100
3.	Retention of pearl millet for Home consumption (q)	1.12	11.70
4.	Marketed surplus in Channel-I (Producer- -Consumer)	2.31	24.30
5.	Marketed surplus in Channel- II (Producer---Retailer-Consumer)	3.32	34.94
6.	Marketed surplus in Channel- III (Producer-Wholesaler- Retailer-Consumer)	2.75	28.94
7.	Total Marketed surplus	8.38	88.21

4.9. Per quintal marketing cost incurred by producer

In marketing of pearl millet, the costs incurred by producer which termed as marketing cost in different channels. In channel I producer had incurred Rs. 25.98 per quintal marketing cost. Among the different items of cost packaging charges were maximum i.e Rs.11.87(45.45 per cent) followed by labour charges Rs.3.08 (11.85 cent), transportation charges Rs.5.78 (22.24 per cent), weighing charges Rs.4.03 (15.51 per cent), losses Rs.1.22 (4.69 per cent). In channel II producer incurred Rs.33.69 per quintal as marketing cost ofwhich packaging cost was maximum Rs.12.71 (37.72 per cent), transportation cost Rs.10.57 (31.36 per cent), weighing charges Rs. 3.84 (11.32 per cent) and losses Rs.2.93 (2.93 per cent). In channel -III producer incurred 38.17 per quintal as marketing cost, out of which labouring transportation and packaging charges were major items of cost.

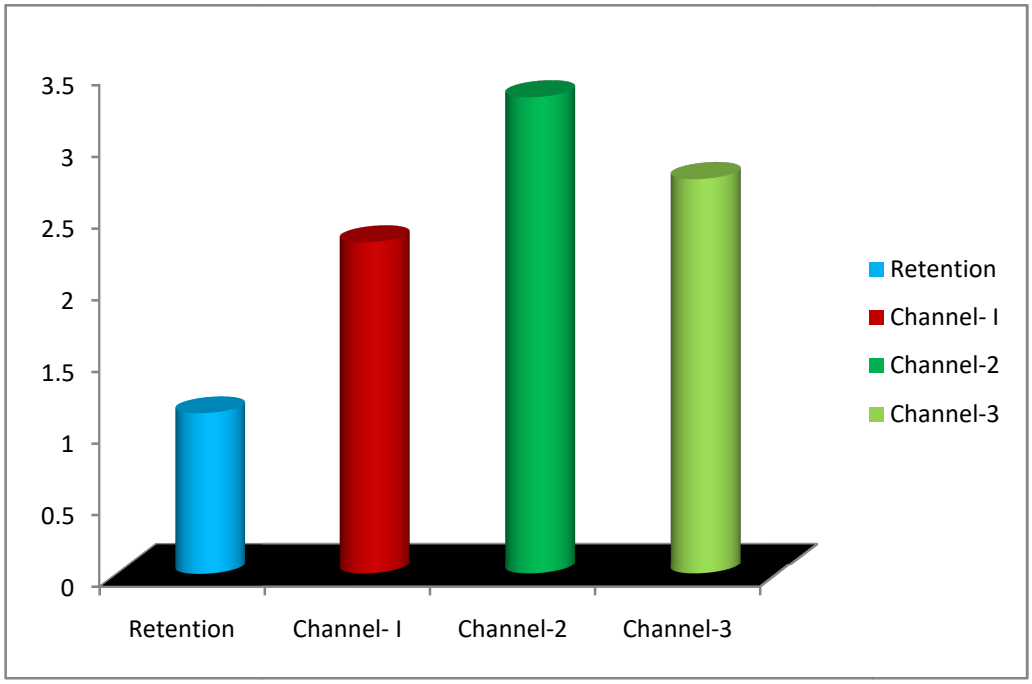

Fig.4.5: per farm marketed surplus of pearl millet

Plate 4.5: Auction method of pearl millet marketing at Gevrai market

Plate 4.6: Unloading of pearl millet at Majalgaon market

Table 4.9: Per quintal marketing cost incurred by producer (Rs/q)

Sr. No.	Particulars	Channel-I	Channel-II	Channel-III
1.	Packaging charges	11.87 (33.93)	12.71 (37.72)	14.27 (37.38)
2.	Transportation charges	5.78 (33.67)	10.57 (31.36)	12.14 (31.79)
3.	Weighing charges	4.03 (11.52)	3.84 (11.32)	4.20 (11.00)
4.	Losses	1.22 (9.20)	2.93 (8.61)	3.36 (8.82)
5.	Labour charges	3.08 (11.60)	5.54 (15.85)	6.12 (16.04)
Total cost incurred by producer		**25.98** **(100)**	**33.69** **(100)**	**38.17** **(100)**

4.10. Per quintal marketing cost incurred by wholesaler

Marketing functionary i.e wholesaler was existed in channel III only. Marketing cost incurred by him is present in Table 4.10 which was Rs. 47.90 per quintal out of which maximum cost i.e Rs.4.20 (8.76 per cent) was paid as labour charges followed by Rs.9.33 (3.63 per cent) as commission charges, Rs.5.42 (11.31 per cent) transportation charges. Other items of cost were shop tax, losses, electrical charges, license charges and market fees.

Table: 4.10: Per quintal marketing cost incurred by wholesaler (Rs/q)

Sr. No.	Particulars	Channel –III
1.	Labour charges	4.20 (8.76)
2.	License charges	4.20 (8.76)
3.	Shop tax	14.18 (29.60)
4.	Transportation charges	5.42 (11.31)
5.	Electric charges	3.83 (7.99)
6.	Market fee	3.83 (14.07)
7.	Losses	6.74 (2.19)
8.	Commission Charge	9.33 (3.63)
Total cost incurred by wholesaler		**47.90 (100)**

4.11. Per quintal marketing cost incurred by retailer

The retailer was exited in channel II and III. The cost incurred by retailer, in respective channel is presented in Table 4.11, in channel II retailer paid Rs. 35.28 and channel III Rs. 41.23 as marketing cost. Transportation charges was maximum charges paid in both channels i.e Rs.11.11(31.49 per cent) and Rs.4.01 (22.70 per cent) followed by licence charges in channel II and III. The other items cost of labour charges, losses, commission charges and marketing fees.

Table 4.11: Per quintal marketing cost incurred by retailer (Rs/q)

Sr.No.	Particulars	Channel-II	Channel –III
1.	Labour charges	3.84 (10.88)	4.20 (22.90)
2.	Transportation charges	11.11 (31.49)	12.82 (31.09)
3.	Market fee	5.34 (15.13)	6.74 (15.96)
4.	Losses	3.84 (10.88)	4.81 (11.66)
5.	license charges	8.01 (22.70)	8.83 (21.41)
6.	Commission Charge	3.14 (8.90)	3.83 (9.28)
Total cost incurred by Retailer		**35.28** **(100)**	**41.23** **(100)**

4.12 .Marketing efficiency of pearl millet crop

In Table 4.12 the marketing efficiency in channel I value of pearl millet i.e consumer price, total marketing cost and marketing efficiency was Rs 2430, Rs 25.98 and Rs 92.53 respectively. In channel II value of pearl millet i.e consumer price, total marketing cost and marketing efficiency was Rs 2435.56, Rs 68.97 and Rs 34.31 respectively. In channel III value of pearl millet i.e consumer price, total marketing cost and marketing efficiency was Rs 2481.55, Rs 127.30 and 18.49 respectively.

Table 4.12: Marketing efficiency of pearl millet crop (Rs/q)

Sr. No.	Particulars	Channel-I	Channel-II	Channel-III
1.	Value of pearl millet i.e. consumer price (Rs./q.) **(V)**	2430	2435.56	2481.55
2.	Total marketing cost (Rs./q.) **(I)**	25.98	68.97	127.30
3.	**Marketing efficiency (M)**	**92.53**	**34.31**	**18.49**

4.13. Per quintal Price spread in pearl millet marketing

Price spread is the difference between price paid by consumer and price paid by producer. As the number of functionaries increases in the channel, producers share in consumers rupees decreases. It is seen from table 4.13 that price spread in channel I was Rs. 25.98 which was the marketing cost incurred by producers only, since channel I is direct channel price spread is comparatively low than other channel. In channel II per quintal price spread was Rs.2335.56 of which producer received only 95.71 per cent share. Total marketing cost in channel II was Rs. 68.97 and total marketing margin was Rs. 35.28, which were 2.83 and 1.51 per cent respectively to price spread by consumer. Hence price spread was Rs. 104.25. In channel III i.e. producer- wholesaler- retailer- consumer, price paid by consumer was Rs. 2481.55 of which producers Share was only 90.74 per cent. The price spread was Rs. 229.72 in which total marketing cost was Rs. 127.30 and marketing margin was 102.42 per cent.

Table.4.13: Per quintal price spread in pearl millet marketing

Sr. No.	Particulars	Channel-I	Channel-II	Channel-III
1.	Net price received by producer **(producer Share in consumer rupee)**	2404.02 (98.56)	2331.31 (95.71)	2251.83 (90.74)
2.	Price received by producer	2430 (100)	2365 (97.10)	2290 (92.28)
3.	Cost incurred by producer	25.98 (1.06)	33.69 (1.38)	38.17 (1.53)
4.	Price received by wholesaler	---	---	2290 (92.28)
5.	Cost incurred by wholesaler	---	---	47.90 (1.93)
6.	Margin of the wholesaler	---	---	47.90 (1.93)
7.	Price received by retailer	---	2365 (97.10)	2385.80 (97.23)
8.	Cost incurred by retailer	---	35.28 (1.84)	41.23 (1.50)
9.	Margin of retailer	---	35.28 (1.44)	54.52 (2.19)
10.	Price paid by consumer	2430 (100)	2435.56 (100)	2481.55 (100)
11.	Total marketing cost	25.98 (1.06)	68.97 (2.83)	127.30 (5.12)
12.	Total marketing margin	---	35.28 (1.51)	102.42 (4.12)
13.	**Price spread**	**25.98 (100)**	**104.25 (100)**	**229.72 (100)**

Note: (Figures in the parentheses indicate percentage to total)

4.14. Constraints and Suggestions reported by pearl millet grower

The constraints and suggestion was studied by applying frequency distribution technique and it is presented in Table 4.11. It is seen from table that low market price for pearl millet was the major constraints reported by 76.66 per cent growers. Another constraint was low rainfall which is reported by 47.77 per cent growers and therefore low yield of pearl millet were harvested by the growers. Third major constraints was unavailability of labour at harvesting time 60.00 per cent, followed by unavailability of funds for purchasing inputs, reported by 54.44 per cent growers. The other constraints were high rate of transportation and unavailability of vehicle in village, which were reported by 26.66 and 25.55 per cent pearl millet grower respectively. Suggestions were also called from growers and 72.22 per cent growers suggested that storage structure at village level should be created to overtake the constraint of low market price. Use rain water harvesting technique, the suggestion was given by 61.11 per cent of grower to tackle the problem of low rainfall. The problem of unavailability of labour should tackle the problem by adjusting sowing time by 15- 20 days which was 60 per cent pearl millet suggested. Unavailability of fund to purchasing for input should be meet by taking loan from nationalized bank which was by 58.88 per cent pearl millet grower suggested.

Table 4.14: Constraints and Suggestions reported by pearl millet growers

Sr. No.	Constraints	Frequency	Per cent N=90
1	Low market price for pearl millet	69	76.66
2	Low rainfall	43	47.77
3	Un-availability of labour at time of harvesting	54	60.00
4	Un- availability of funds for purchasing input	49	54.44
5	Higher rate of transportation	24	26.66
6	Un-availability of vehicle in time in village for transportation	23	25.55

Sr. No.	Suggestions	Frequency	Per cent N= 90
1	Storage structure at village level should be executed	65	72.22
2	Use rain water harvesting technique	55	61.11
3	Sowing period should be adjusted	54	60.00
4	Crop loan should be taken by the farmer from nationalized bank.	53	58.88

CHAPTER-V

SUMMARY AND CONCLUSIONS

CHAPTER-V

SUMMARY AND CONCLUSIONS

The main purpose of this chapter is to summarize the results of present work carried and to draw useful conclusions on the basis of these results and also to make suitable recommendations.

The research study entitled, “Economics of production and marketing of pearl millet in beed district” was undertaken with the following heads.

Objectives:

1. To study socio-economic characteristics of pearl millet growers
2. To estimate cost and return of pearl millet crop
3. To workout marketing cost, marketing margin, marketing efficiency and price spread in different channels of pearl millet marketing
4. To know the constraints and opinions of pearl millet grower

Multistage sampling design was adopted in selection of district, tehsils, villages and selection of pearl millet growers. At first stage, Beed district was purposely selected on the basis of availability of pearl millet area. At second stage, two tehsils of beed district were selected on the basis of area under pearl millet production. At third stage, from each selected tehsil, three villages were selected on the basis of higher area under pearl millet cultivation. At final stage, the separate list of pearl millet growers was obtained from each village and fifteen pearl millet growers were selected randomly from each village. Thus, 90 pearl millet growers were selected for study.

The results of the present investigation are summarized as under: the result revealed that, 33.33 per cent millet growers comes under the age group of 25 to 40 years, 66.66 per cent comes under 40 to 55 years age group are respectively and 11.11 per cent fall under 55 and above age group. Education is another important factor influcing managerial and technical ability of any business. It was seen from Table 4.1 that, 42.22 per cent pearl millet growers were educate up primary education, followed by 34.44 per cent have completed college level education and 23.33 per cent pearl millet growers were illiterate. It is observed from table 4.1 that,

most of the pearl millet growers are engaged in farming sector. Out of 90 pearl millet growing respondents (66) 72.22 per cent were having farming as their main occupation. While (19) 20.00 per cent secondary and (5) 7.77 per cent tertiary occupation., Size of land holding observed from table 4.1, it indicate that, 6.66 percent pearl millet growers have land up to 2 ha, 92.22 percent pearl millet growers have land up to 2 ha to 4 ha and 1.11 percent pearl millet growers have land above 4 ha. The composition of livestock, most of the pearl millet respondents use the bullock for farming, about 31.15 percent bullock used by average pearl millet growers. After that respondents have 34.89 percent cow, 33.95 percent buffalos. Cropping pattern of the sample farmer was dominated by *kharif* crops because 67.34 per cent of the total gross cropped area was covered by *kharif* crops. Among the different *kharif* crops, pearl millet was grown on 12.65 per cent area of gross cropped area followed by Cotton (41.26 per cent), soybean (5.56 per cent), Red gram (0.08 per cent) and Green gram (0.75 per cent). During *rabbi* season wheat, Chick pea and *rabi* jowar were cultivated by the farmer.

In summer season vegetables were grown on 3.54 per cent area. But, sugarcane was the major crop cultivated by pearl millet grower on 12.40 per cent area of gross cropped area. The net sown area 2.66 ha and double crop area 1.29 ha with cropping intensity was 148.58 per cent. Per hectare 18.81 and 5.54 man days of hired human labour and family human labour were utilized for one ha pearl millet cultivation. Similarly 1.03 pair days and 5.39 hr of bullock labour and machine labour were used for per hectare pearl millet cultivation respectively. With the respect to seed, it is observed that 3.62 kg per ha seed was utilized in pearl millet cultivation. In case of manures and fertilizer it is seen that 11.12 q manures, 29.12 kg nitrogen, 14.42kg phosphorus and 10.44kg potassium were utilized per ha pearl millet cultivation. With respect to per hectare output of pearl millet it is found that 9.50 q of main produce and 9.00 q of by produce was harvested by sample farmer.

Per hectare total cost of cultivation of pearl millet was Rs. 18067.03 out of which cost A was 67.30 per cent and cost B was 94.35 per cent. Among the different items of variable cost hired human labour was maximum i.e. 18.81 per cent, followed by machine labour (10.29 per cent) and bullock labour (10.01 per cent). The proportion of seed, manure, and fertilizer was 3.22 per cent, 4.42 per cent and 8.50 per cent, respectively, gross return from pearl millet cultivation obtained were Rs.

22058.16, farm business income Rs. 9785.14. Family labour income was Rs. 4690.43. net returns Rs. 3700.46 The output input ratio was worked out to 1.20.Average farm size of pearl millet was 0.50 ha, and production was 9.50 q. Out of which 11.70 per cent retained for family consumption and 88.21 per cent produce was marketed through different channels. In marketing of pearl millet three different channels were identify i.e. I) Producer - Consumer, D) Producer - Retailer- Consumer and III) Producer- Wholesaler - Retailer - Consumer

From channel I, 2.31 q produce was marketed which was 24.30 per cent of the total production Similarly, from channel II and III 3.32 q and 2.75 q, pearl millet was marketed which was 34.94 per cent and 28.94 per cent, respectively to the total production.

In channel I, II and III, producer has incurred Rs. 25.98, Rs.33.69 and Rs. 38.17 per quintal as marketing cost out of which packaging charges, transportation and commission charges were major items of cost.

Per quintal marketing cost incurred by retailer in channel II and III was Rs. 35.28 and Rs. 41.23, respectively. Transportation charges were maximum charge paid in both channels i.e. 11.11 per cent and 12.82 per cent followed by losses i.e. 10.88 per cent and 11.66 per cent, respectively.

Price spread in channel I was Rs.25.98 which was the marketing cost incurred by producers only. In channel II per quintal price paid by was Rs.2435.56 of which producer received only 95.71 per cent share. Total marketing cost in channel II was Rs. 68.97 and total marketing margin was Rs. 35.28, In channel III price paid by consumer was Rs. 2481.55 of which producers share was only 90.74 per cent. The price spread was Rs. 229.72 in which total marketing cost was Rs. 127.30 and marketing margin was 102.42 per cent. Low market price for pearl millet was the major constraint reported by 76.66 per cent growers and 72.72 per cent growers suggested that storage structures should be available at village level to overtake the problem.

Another constraint was low rainfall which was reported by 47.77 per cent growers and therefore low yield of pearl millet were harvested by the growers.

About 61.11 per cent growers suggested using rain water harvesting technique and its conservation in farm ponds.

Conclusion

The following broad conclusions are drawn from the present study:

1. Maximum i.e 66.66 per cent pearl millet grower come under 40-55 year age group.

2. Average family size of pearl millet grower was 6.11 number.

3. Maximum pearl millet growers (42.22 per cent) were educated up to primary education.

4. Gross cropped area on pearl millet farm was 3.95 ha.

5. Area under pearl millet crop was 0.50 ha.

6. Cropping intensity on pearl millet farm was 148.49 per cent.

7. Per hectare use of hired human labour was maximum which 7.45 man days. .

8. Per hectare cost of cultivation of pearl millet was Rs. 18067.03.

9. Per hectare profit in pearl millet cultivation was Rs. 3991.13.

10. Per quintal marketing cost incurred by producer in channel-I, II and III was Rs. 25.98, Rs.33.69 and Rs. 38.17 in pearl millet marketing.

11. Per quintal marketing cost incurred by wholesaler in channel- III was Rs. 47.90.

12. Per quintal marketing cost incurred by retailer in channel-II and III in pearl millet marketing was Rs.35.28 and Rs. 41.23, respectively.

13. Per quintal price spread in pearl millet marketing in channel-I, II and III was Rs.25.98, Rs.104.25 and Rs. 229.72, respectively.

14. Low market price for pearl millet and low rainfall were the major constraints reported by farmers.

15. To overcome the above constraints, storage structure at village level and use of rain water harvesting technique and these suggestions were reported by farmers.

Policy implications

I. Agricultural university / state agriculture department should organize training or workshop regarding modem cultivation practices of crop frequently.

2. Farmer should also trained in rain water harvesting techniques and that water should be conserved in farm ponds to tackle irregularity of rain.

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APPENDICES

APPENDIX-I

SCHEDULE-I

TITLE: - ECONOMICS OF PRODUCTION AND MARKETING OF PEARL MILLET IN BEED DISTRICT OF MAHARASHTRA

1. Socio- economic Characteristics of pearl millet growers

1. Name:

2. Village: Taluka: District:

3. Age :

4. Mobile no:

5. Education: Illiterate/High school/college level/post graduate

6. Family: Male: Female: Children:

7. Occupation: 1] Primary

2] Secondary

3] Tertiary

8. Land holding: Total land _____ha.

Rainfed land____ha.

Irrigated land ____ha.

Un-cultivated land ___ha.

9. Land revenue: 10. Distance of farm from village (km):

2. Cropping Pattern

Kharif			Rabi			Summer		
Crop (Variety)	**I (ha)**	**R (ha)**	**Crop (Variety)**	**I (ha)**	**R (ha)**	**Crop (Variety)**	**I (ha)**	**R (ha)**

Sole crop or mixed crop or intercrop

3. Livestock

Sr. No.	Name of livestock		No.	Age/Year of purchase	Present value(Rs)
1	Bullock Pair				
2	Cow	Milch			
		Dry			
3	Buffalo	Milch			
		Dry			
4	Goat				
5	Sheep				
	Total				

4. Machinery

Sr. No.	Assets	No./Qty.	Year of purchase	Present Value (Rs.)
1	Tractor			
2	Thresher			
	Other			
	Total			

5. Irrigation structure

Sr. No.	Assets	No./Qty.	Year of purchase / construction	Present Value(Rs)
i) a)	Well			
b)	Tube well			
c)	Canal			
ii)	Electric Motor			
iii)	Shed for electric Motor			
iv)	Pipeline (Length)			
	Total			

6. Commonly used assets

Sr. No.	Assets	No./Qty.	Year of purchase	Present value (Rs.)
i)	Plough			
ii)	Harrow			
iii)	Seed drill			
iv)	Hoe			
v)	Bullock cart			
vi)	Sprayer			
	a) Hand sprayer			
	b) Foot sprayer			
	c) Power sprayer			
	Total			

7. Operation wise labour requirement for pearl millet crop [Area: ha]

Operation	No	Human labour				Bullock (Pair day)	Machine power (hours)
		Hired male (Manday)	Hired female (Manday)	Family male (Manday)	Family female (Manday)		
Ploughing							
Harrowing							
Cleaning							
Manuring							
Sowing							
Irrigation							
Fertilizing							
Weeding							
Hoeing							
Harvesting							
Threshing							
Other							
Total							

Rate of labours (Rs) : Peak season: Slack season:

Male/day:

Female /day:

Bullock / day:

Machinery /day:

8. Use of physical inputs in pearl millet production

Particulars	**Unit**	**Qty**	**Rate/Unit**	**Value (Rs.)**
1.Seed	Kg			
2.Type of fertilizers	Bag			
i) 18:18:10				
ii) 20:20:0				
iii) SSP				
iv) DAP				
v) Urea	Kg			
3. Manure	Cl			
i)				
ii)				
4. Plant Protection	Kg/lit			
i)				
ii)				
5. Irrigation	No			

9. Yield of pearl millet crop

Particular	**Qty.(q)**	**Rate/q**	**Value (Rs.)**
1.Main produce (grains)			
2. By produce (husk)			

10. Information about disposal of pearl millet

Sr. No.	Detail	Quantity (q.)	Rate/q	Value(Rs./q)
I.	Total yield of Pearl millet			
II.	Pearl millet sold			
III.	Pearl millet kept for seed Purpose			
IV.	Pearl millet kept for home Purpose			

SCHEDULE-II
MARKETING OF PEARL MILLET

1. General information

Name of Market :

Distance (km) :

2. Retention and marketed surplus of grain (q/farm)

Sr. No.	Particular	Qty.	Per cent
1.	Production of main produce of farm		
2.	a) Retained for family consumption		
	b) Retained for seed		
	c)Damage		
	d)Other		
	e)Total retention		
3	Marketed surplus		
	a)Channel-I		
	b)Channel-II		
	c)Channel- III		
	Total		

3. Cost of marketing incurred by producer

Sr. No.	Item of cost	Channel-I	Channel-II	Channel-III
1.	Loading charges			
2.	Transport charges			
3.	Unloading charges			
4.	Weighting charges			
5.	Commission charges			
6.	Market fees			
7.	Deduction			
	Sub total			

4. Cost incurred by village retailer

Sr. No.	Items of cost	Amount (Rs/q)
1.	Labour charges	
2.	Commission charges	
3.	Transportation charges	
4.	Weighing charges	
	Sub total	

5. Cost incurred by wholesaler

Sr. No.	Items of cost	Total value (Rs)
1.	Stall rent	
2.	License charges	
3.	Labour charges	
4.	Electric charges	
5.	Transportation charges	
6.	Market fee	
7.	Losses	
8.	Others	

6. Cost incurred by pearl millet crop.

Sr. No.	Items of cost	Amount(Rs/Kg)
1.	Labour charges	
2.	Transportation	
3.	License charges	
4.	Shop tax	
5.	Depreciation, repair on fixed cost @10%	
6.	Interest on fixed cost @12%	
7.	Electric charges	
8.	Losses	
9.	Others	
10.	**Total cost (Σ 1 and 9)**	

7. Cost incurred by pearl millet- retailer

Sr. No.	Items of cost	Total value (Rs)
1.	Shop tax	
2.	License charges	
3.	Labour charges	
4.	Electronic charges	
5.	Communication charges	
6.	Transportation charges	
7.	Depreciation, repair on fixed cost @10%	
8.	Interest on fixed cost @12%	
9.	Packing with storage	
10.	Total cost (Σ1 to 9)	

APPENDIX-II

Score and rate per unit used

Sr. No.	Particular	Score / rate
1.	**Education:**	
	Illiterate	1
	High school	2
	College level	3
2.	**Fertilizer**	
	Nitrogen (kg)	Rs.13.04/kg
	Phosphorus (kg)	Rs.38.43/kg
	Potash (kg)	-
3.	**Labour**	
	Hired male labour	Rs. 300/ mandays
	Hired female labour	Rs. 150/ mandays
	Hired bullock labour	Rs. 400/ pairdays
	Hired machine labour	Rs. 800/ hour
4.	**Seed**	Rs. 170/ kg
5.	**Manure**	Rs.225/ qtl
6.	**Price of commodities**	
	Main produce of pearl millet	Rs.2050/qtl
	By produce of pearl millet	Rs.300/qtl

APPENDIX-III

List of Selected Pearl millet Growers in Beed District

Sr. No.	Name of Pearl millet growers	Tehsil	Village	Area Under Pearl millet (ha)
1	Kishor Rajguru	Georai	Rajapur	3.6
2	Vachistha Bedake	Georai	Rajapur	3
3	Sidheswar Kabilkar	Georai	Rajapur	2.7
4	Munna Shekh	Georai	Rajapur	2.6
5	Akshay Talekar	Georai	Rajapur	2.4
6	Ashok Bedake	Georai	Rajapur	2.4
7	Balasaheb Rajguru	Georai	Rajapur	3.4
8	Kiran Bedake	Georai	Rajapur	2.2
9	Satish Bedake	Georai	Rajapur	3.2
10	Jayram Bedake	Georai	Rajapur	3
11	Yogesh Bedake	Georai	Rajapur	2.8
12	Kalyan Talekar	Georai	Rajapur	2.8
13	Pralhad Bedake	Georai	Rajapur	2.4
14	Sandip Rajguru	Georai	Rajapur	2.6
15	Yogesh Garje	Georai	Rajapur	2.4
16	Chandrakant Rathod	Georai	Thakarwadi	3.2
17	Eknath Chavan	Georai	Thakarwadi	3
18	Navnath Pawar	Georai	Thakarwadi	2.6
19	Ravindra Chawan	Georai	Thakarwadi	2.8
20	Babasaheb Rathod	Georai	Thakarwadi	3
21	Baban Chavan	Georai	Thakarwadi	3
22	Anil Chavan	Georai	Thakarwadi	2
23	Hukoom Chavan	Georai	Thakarwadi	3.2
24	Rajendra Chavan	Georai	Thakarwadi	2.8
25	Gopinath Rathod	Georai	Thakarwadi	3.4
26	Kashinath Chavan	Georai	Thakarwadi	3
27	Sudam Aade	Georai	Thakarwadi	2.3
28	Sanjay Rathod	Georai	Thakarwadi	3.4
29	Akash Jadhav	Georai	Thakarwadi	2.8
30	Sukhdev Chavan	Georai	Thakarwadi	2.8
31	Mauli Bhikari	Georai	Jategaon	3.6
32	Babasaheb Bhikari	Georai	Jategaon	3.2
33	Shivaji Bhikari	Georai	Jategaon	2.8
34	Pintu Chavan	Georai	Jategaon	3
35	Kalyan Chavan	Georai	Jategaon	2.4
36	Ganesh Bhikari	Georai	Jategaon	2.6
37	Chitnya Mandve	Georai	Jategaon	2.6
38	Pritam Mandve	Georai	Jategaon	3.4
39	Changdev Mandve	Georai	Jategaon	2.1
40	Ramchandra Patil	Georai	Jategaon	2
41	Sharad Mandve	Georai	Jategaon	2.4
42	Vitthal Mandve	Georai	Jategaon	2
43	Jayantrao Mandve	Georai	Jategaon	4.4

44	Vitthal Patil	Georai	Jategaon	1.7
45	Bharat Mandve	Georai	Jategaon	3
46	Ganesh Bodakhe	Majalgaon	Payatalwadi	2.4
47	Vasant Bodakhe	Majalgaon	Payatalwadi	2.1
48	Asaram Arjun	Majalgaon	Payatalwadi	2.4
49	Kondiba Bodahke	Majalgaon	Payatalwadi	3
50	Asaram Narvate	Majalgaon	Payatalwadi	3
51	Sugriv Narvate	Majalgaon	Payatalwadi	3.6
52	Gajanan Narvate	Majalgaon	Payatalwadi	2.8
53	Dharmraj Arjun	Majalgaon	Payatalwadi	2.6
54	Bhagwat Arjun	Majalgaon	Payatalwadi	3.6
55	Baburao Arjun	Majalgaon	Payatalwadi	2.4
56	Rohidas Arjun	Majalgaon	Payatalwadi	3.6
57	Suryabhan Khatal	Majalgaon	Payatalwadi	3.6
58	Gorakh Khatal	Majalgaon	Payatalwadi	3.4
59	Sanket Narvate	Majalgaon	Payatalwadi	3
60	Asaram Yamgar	Majalgaon	Payatalwadi	2.5
61	Suresh Jagtap	Majalgaon	Sawargaon	2.2
62	Prabhakar Jagtap	Majalgaon	Sawargaon	3.3
63	Appasaheb Jagtap	Majalgaon	Sawargaon	3.5
64	Ashok Jagtap	Majalgaon	Sawargaon	2.4
65	Yogesh Jagtap	Majalgaon	Sawargaon	2.5
66	Akash Jagtap	Majalgaon	Sawargaon	3.4
67	Badrinath Jagtap	Majalgaon	Sawargaon	3.4
68	Mahadev Jagtap	Majalgaon	Sawargaon	3
69	Kalyan Jagtap	Majalgaon	Sawargaon	3.4
70	Machindra Jagtap	Majalgaon	Sawargaon	2.4
71	Shivaji Jagtap	Majalgaon	Sawargaon	2.4
72	Rushikesh Jagtap	Majalgaon	Sawargaon	3.2
73	Ashok Rathod	Majalgaon	Sawargaon	2.6
74	Jotish Jagtap	Majalgaon	Sawargaon	2.8
75	Amol Shinde	Majalgaon	Sawargaon	2.4
76	Balaji Dake	Majalgaon	Waghora	4
77	Narayan Shinde	Majalgaon	Waghora	3.2
78	Lakhan Badade	Majalgaon	Waghora	2
79	keshav Dake	Majalgaon	Waghora	4.4
80	Dyaneswar Dake	Majalgaon	Waghora	1.7
81	Arjun Shinde	Majalgaon	Waghora	3
82	Parmeswar Gayakwad	Majalgaon	Waghora	3
83	Bharat Shinde	Majalgaon	Waghora	3.4
84	Hanuman Sawant	Majalgaon	Waghora	2.6
85	Nitin Sawane	Majalgaon	Waghora	2.4
86	Nagurao Thombare	Majalgaon	Waghora	2.2
87	Sudam Shinde	Majalgaon	Waghora	3
88	Tukaram Katare	Majalgaon	Waghora	3
89	Ganesh Kate	Majalgaon	Waghora	2.2
90	Ashish Shinde	Majalgaon	Waghora	2.6

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