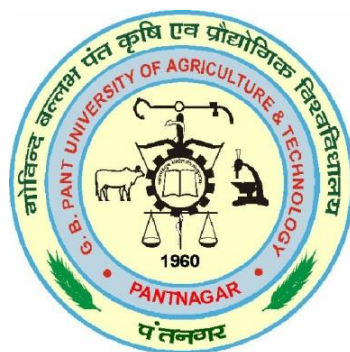


# AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF SMALL MILLETS IN CHAMOLI DISTRICT OF UTTARAKHAND

Thesis

Submitted to the



G. B. Pant University of Agriculture & Technology  
Pantnagar- 263145, Uttarakhand, India

By

Anjali Rawat

ID. No. 56983

*IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF*

**Master of Science in Agriculture**  
(Agricultural Economics)

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# ACKNOWLEDGEMENT

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**Pantnagar  
September, 2022**

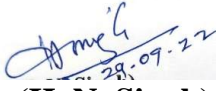
  
**(Anjali Rawat)  
Authoress**

# CERTIFICATE-I

This is to certify that the thesis entitled “**AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF SMALL MILLETS IN CHAMOLI DISTRICT OF UTTARAKHAND**” submitted in partial fulfillment of the requirements for the degree of **Master of Science in Agriculture** with major in **Agricultural Economics**, of the College of Post-Graduate Studies, G. B. Pant University of Agriculture and Technology, Pantnagar , is a record of bona fide research carried out by **Ms. Anjali Rawat, Id. No. 56983**, under my supervision and no part of the thesis has been submitted for any other degree or diploma.

The assistance and help received during the course of this investigation have been acknowledged.

Pantnagar  
September, 2022

  
**(H. N. Singh)**  
Chairman  
Advisory Committee

## CERTIFICATE-II

We, the undersigned, members of the Advisory Committee of **Ms. Anjali Rawat, Id. No. 56983**, a candidate for the degree **Master of Science in Agriculture** with major in **Agricultural Economics**, agree that the thesis entitled **“AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF SMALL MILLETS IN CHAMOLI DISTRICT OF UTTARAKHAND”** may be submitted in partial fulfillment of the requirements for the degree.



(H. N. Singh)

Chairman

Advisory committee



(Chandra Dev)

Member



(Ajay Kumar Tripathi)

Member

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# *Introduction*



### **1.1 Background**

Millets are one of the oldest foods known to humans and probably the first among cereals to be cultivated for domestic purpose. At present, India is the largest producer of millets in the world producing 15.53 million tonnes from an area of about 12.45 million hectares with productivity of 1247 kg per hectare. Small millets hold a major share in the total millet production in the country producing around 12.46 million metric tonnes from an area of 8.87 million hectares. Among all the small millets, India is the topmost producer of barnyard millet and finger millet with 99.90 % and 53.30 % share of total production, respectively (**IIMR, Hyderabad 2021-22**). Millets emerge as one of the promising food and fodder crops to meet the food and nutritional security challenges of the country. In the view of this, the Government of India has also approved year 2018 as the ‘**National Year of Millets**’ to boost the production of millets in the country.

The 193 members of United Nation General Assembly has unanimously adopted the resolution, declaring 2023 as the ‘**INTERNATIONAL YEAR OF MILLETS**’, that aims at creating awareness about the health benefits of these grains and their suitability for cultivation under changing climatic conditions (**Ministry of Agriculture and Farmer’s Welfare**).

Millets are the group of small grained cereal food crops grown all over the world for food as well as fodder purpose. Millets are popularly known as **Nutri-cereals**, as they provide most of the nutrients. The group of these major and small millets along with maize and barley together called coarse cereals. There are two categories of millet; major and small millets. Major millets include sorghum and pearl millet, whereas, small millets included finger millet, barnyard millet, kodo millet, foxtail millet, proso millet and little millet. Small millets are crops of antiquity suitable for dry lands as they require less input and water unlike other crops as wheat, rice sugarcane etc. They are of a great importance in hilly and tribal farming areas. It serves food security for disadvantaged regions, adapting to different ecological conditions,

ideal for climate resilient and having unique nutritional properties—high fiber, quality protein and mineral composition etc.

Millets are known as ancient staple foods which belong to the Poaceae family with their origin in the tropics of Asia and Africa. India is the leading producer of millets in the world and has a global share of 41% followed by Africa. In India major millets producing states are Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra, Odisha, Madhya Pradesh, Rajasthan and Uttarakhand. Small millets mainly cultivated in 11 states in which Madhya Pradesh has nearly 30% share in total area followed by Chhattisgarh (14.41%) and Maharashtra (13.52%). In the same way, production share is also high in Madhya Pradesh (13.52%) followed by Uttarakhand (19.23%) and Maharashtra (10.12%) (**Gowri and Shivakuamr, 2020**).

Uttarakhand has a strong hold on small millet production in the country with about 30% area under small millets cultivation and more than 90% is under rainfed conditions. Among the seven small millets that are grown in India, finger millet and barnyard millet, also locally known as Ragi/Mandua and Sanwa/Jhingora, respectively which are extensively grown in the state of Uttarakhand, whereas, the other small millets like foxtail and proso millet cover lesser area and are grown as catch crop in some patches of the state.

Millets are often referred to as **super food** and its production can be seen as an approach for sustainable agriculture. Recently the millet products are marketed as **health foods** – to increase their utilization in popular foods. They are helpful in sequestering carbon present in the atmosphere and soil and are climate smart crops, as they can thrive in adverse climatic conditions, requiring low inputs unlike other food crops and thus can provide a better scope to the farmers for their cultivation. Millets are also known as orphan crops because they are the final crop to be planted due to less demand for them in the market and profits are relatively smaller than the other crops. However, these crops are integral parts of hilly agriculture system that provides food, fodder and nutritional security to the farming community but remained unappreciated. These crops have significantly contributed to the provision of means of subsistence, food and nutrition in hilly area of the state.

In the union budget 2023-24, millets has been described as ‘**Shree Anna**’ – the mother of all grains.

## Marketing status of Agri-produce in the state

**Uttarakhand Krishi Utpadan Mandi Parishad (UKUMP)** is the nodal agency responsible for agricultural marketing in the state. UKUMP has created state-wide network for marketing of agricultural produce with 25 Principal Market Yards, 31 Sub Market Yards and 27 Weekly Markets.

**Status of APMC Act:** The state government has amended the APMC Act, in line with Model Act 2003. The amended Act facilitates setting up of private markets, farmer's consumer markets, reduced fee on perishable horticulture produce, contract farming, e-NAM for e-trading etc.

### 1.2 Problem statement

Agriculture in the mountains of Uttarakhand is mostly subsistence where small millets occupy an important place especially in hilly regions. About 80% of people in the Garhwal hills of the central Himalayas practice subsistence agriculture (**Maikhuri et al. 2001**). Uttarakhand is one of the major small millets producing states of the country, mainly the small millet with the major production in Chamoli district which is third largest district in terms of area, production and productivity in the state. The state has an area of 1.08 lakh hectares under finger millet and 0.6 lakh hectares under other small millets while the yield per unit area exceeds the national average in both the cases (**Bhat et al. 2019**). Millets have been a nutritive food since time immemorial and kept on serving as major share in the food grains production all over the world. In the last five decades, the area under millet production has been shrinking. Cultivation of these millets now faces many constraints resulting in decline in area of cultivation of these crops (**Gowri and Shivakumar, 2020**).

With the success of Green Revolution, the dependence on the wheat and rice have grown drastically, leading to the displacement of staples like millets from the farm and ultimately from the dietary habits of the people. These millets might have diversified high food value but their consumption is being declined due to lack of standardized processing techniques to compete with fine cereals like wheat and rice. Now-a-days, farmer are also more interested in commercial agricultural crops thus, replacing sustainable crops like millets with cash crops due to lower relative profitability from them, resulting in the day by day shrinkage of area under millet cultivation (**Michaelraj and Shanmugam, 2013**).

For the millet cultivation to be remunerative in hills, proper management practices should be followed for better returns at lower production cost. But due to various factors like fragmented land holdings coupled with erratic rainfall, high labor cost, lack of awareness about technological development etc. resulted in higher cost and lower returns to the farmers. Besides, above, lack of attractive farm gate prices are also have a negative impact on the income of millet growing farmers. Therefore, it is necessary for the farmers to have knowledge about their production cost to get a considerable net profit all over its cost, ensuring a satisfactory margin between costs of the various inputs and selling price of the produce.

The hilly regions of the state are the disadvantaged areas and are often inaccessible due to high terrain along with inefficient marketing system ultimately impacting the transfer or transportation of the produce for marketing. Thus, just production is not sufficient, proper disposal and marketing too is required for successful marketing of the produce. However the subsistence nature of farming also lead to lower marketed surplus as majority of the produce is used for self-consumption or for fodder purpose.

Although, small millets are known to cope up with abiotic and biotic stresses but sometimes get vulnerable to disease and pest causing heavy losses and damage to the entire crop. However, owing to low popularity in the past, very less information on the millets is currently available.

In the view of above mentioned facts and problematic situations, the present study is proposed to be undertaken to accomplish the following objectives:

### **1.3 Objectives**

Keeping in view the above points, the present study is undertaken with the following objectives:

- 1) To estimate the trend in area, production and productivity of small millets in the Chamoli district.
- 2) To compute the cost of and returns from small millet's cultivation in the study area.
- 3) To analyze the marketing efficiency of small millets.
- 4) To identify the constraints in the production and marketing of small millets.

#### **1.4 Scope of the study**

This study will give an evidence of trends in area, production and productivity of small millets and will also provide a framework of costs of and returns from small millets production as well as marketing aspects and constraints faced by the farmers in production and marketing of small millets. The outcome of the study will be useful to farmers as well as policy makers and other stakeholders. The information generated by the study will help the potential investors for planning production and marketing strategies to take up these small millets' production as a commercial venture. Thus, there is a wide scope of study of various aspects of production and marketing of small millets.

#### **1.5 Limitations of the study**

This study is based on the information collected on memory basis from the sample farmers and other marketing agencies involved and may have some element of error in responses. Natural bias of respondents in collecting primary data can take place when respondents either underestimate or overestimate the information. Further, the study is based on information collected from two blocks only so generalization of the findings in broader perspective can be risky. Besides it, due to COVID-19 pandemic, there were many challenges while collecting the information during survey. Despite having such limitations, the study may be of great help for different stakeholders and policy makers.



*Review*  
*of*  
*Literature*



A brief review of recent research work, relevant to the theme of the present study, is presented in this chapter. This chapter comprises of three sections. Section 2.1 covers the growth in the area, production and productivity of small millets. Section 2.2 deals with the past studies on costs of and returns from small millets cultivation. Under section 2.3, literature related to marketing of small millets has been covered and the last section 2.4 is related to the constraints in production and marketing of small millets. In each section the review has been done in chronological order of publications of studies.

### **2.1 Study related to growth in area, production and productivity of small millets**

**Hile *et al.* (2013)** attempted a study to work out the trend in area, production and productivity of Rabi sorghum in Maharashtra. The area under Rabi sorghum in Maharashtra has shown decreasing trend as compared to the year 1960-1961, it showed -13.20 per cent decline in area in 2009-10. The production has also decreased by 25.48 per cent while the productivity shows an increasing trend over the period of time.

**Michaelraj and Shanmugan (2013)** conducted a study on millets in karur district of Tamil nadu to examine the area under millet cultivation. The study showed the area under small millets like kodo millet, barnyard millet, and little millet, cultivation decreased owing to the increasing cost of cultivation in a gradual manner and also the enhancement in yield was around 82 per cent in finger millet, 95 per cent in little millet, 83 per cent in kodo millet, 43 per cent in foxtail millet, 76 & 82 per cent in proso & barnyard millet, respectively.

**Agarwal *et al.* (2014)** conducted a study to measure the growth performance in area, production and productivity of Soybean in Madhya Pradesh for the year 1966-97 to 2012-13. It was found that the state has a positive value in the production level except for the five years i.e. 1998-99, 2000-01, 2002-03, 2004-05 and 2011-12 with the highest value in the year 2003-04 (73.01%), mainly attributed by the productivity growth (73.11%) and area growth (0.52%) having negligible contribution.

**Boyal *et al.* (2014)** worked out the growth rate in area, production and productivity of fenugreek in the selected districts: Kota, Jhunjhunu and Sikar and for

the state of Rajasthan for the period I (1991-92 to 2000-01), period II (2001-02 to 2010-11) and overall period (1991-92 to 2010-11). Although there was no significant growth in area, production and productivity in Sikar district and the state as a whole during all periods except for the production (5.06% per annum) in the state during period I. There was a significant rise in the production of fenugreek during period I and overall period and negative growth during period II in kota (64.50, 25.82 and -3.29 %) and Jhunjhunu (36.22 & 17.41 %) districts owing to increase in area. Negative growth rate was observed for Sikar district during period I (-8.53 %) and period II (-7.55 %) due to decrease in both area and productivity.

**Malathi *et al.* (2016)** carried out a study to estimate the growth rate of area, production and yield of millets in India for the six decades i.e. from 1950-51 to 2011-12 and it was found that the area under sorghum, pearl millet, finger millet and total millets registered positive growth during 1950-51 to 1980-81 and negative subsequently. Increase in the production of total millets attributed due to their yields.

**Patil and Yeledhalli (2016)** analyzed the growth in the area, production and productivity of different crops in Bengaluru division. The study revealed some of the major crops having highest compound annual growth rate were avare, chrysanthemum, tomato, sunflower, chilies. The highest CAGR was for avare, 24.26 per cent (Bengaluru urban) and 22.26 per cent (Bengaluru rural) in productivity. In case of production of chrysanthemum, it has highest annual growth rate of 22.36 per cent.

**Sakamma *et al.* (2017)** conducted a study in Karnataka for 30 years i.e., from 1984-85 to 2013-14. The study witnessed a negative trend in the growth of area (-3.176 %) and production (-1.274 % per annum) but at the same time, increase in the productivity of finger millet (1.602 %). Increase in productivity may be attributed to the use of high yielding varieties and decline in area was due to increased cost of cultivation and reduced returns which ultimately led to lower production.

**Chaudhari *et al.* (2018)** attempted to calculate the compound growth rate of area, production and productivity of summer Bajra. The study was based on data collected from 126 farmers from 6 randomly selected villages in Banaskatha district of Gujarat. The compound annual growth rate for area (6.90%), production (11.10 %) and productivity (3.93%) were found to be positive on the account of increase in productivity in the region.

**Singh and Sharma (2018)** studied the trend and growth of area, production and yield along with their interaction effect on the production of small millets in the Madhya Pradesh and India for the year 2001-2015. It was found in the study that the area and production of small millets decreased with 7.05 & 1.35 per cent and 5.41 & 2.32 per cent per year whereas, the productivity was found to be increased by 6.13 and 3.37 per cent per year in Madhya and India, respectively. The area & yield interaction impact (1495.16 %), followed by the area effect (1225.13 %), were determined to be the biggest contributors to the drop in small millet output in Madhya Pradesh. The yield effect was found to be negative (- 2620.29 %), indicating that yield was not the cause of the drop in small millet production in Madhya Pradesh. In the state, the decline in small millet output was found to be caused by the area and its interaction with yield. In India, the area effect (211.96 %) and the interaction impact of area and yield (105.51 %) were determined to be the significant contributors to the drop in small millet production.

**Alobid et al. (2019)** analyzed the area, production and productivity under major crops (wheat, barley and cotton) in Syria for the period 2000-2017. The study showed there has been a decline in the area under cultivation of the major crops. The same pattern was observed in case of production and productivity, both has declined during the crisis period.

**Das et al. (2020)** analyzed the study on the area, production and productivity of pearl millet and finger millet for the year 2000-01 to 2016-17 in India showing the reduction in the area of pearl millet from 9.83 to 7.47 million hectares, the total production of pearl millet increased from 6.76 million tons in 2000-01 to 9.8 million tons in 2016-17. A rise in production can be linked to an increase in the number of workers. Pearl millet productivity has more than doubled from 6.9 to 13.1 quintals per hectare notwithstanding the fact that the area of cultivation was reduced over the era from the year 2000 to the year 2016.

## **2.2 Studies related to cost of and returns from production of small millets**

**Khan et al. (2005)** carried out a study to determine the net returns of the three major crops- wheat, maize, and paddy in Malakand district of North West Frontier Province (NWFP) of Pakistan in 2000. The total gross return was highest for rice (Rs.10932 per acre), wheat (Rs.8613 per acre) and then maize (Rs.7745 per acre). Similarly, the net returns from rice, wheat and maize were Rs.4837, Rs.4509 and Rs.3672 per acre, respectively.

**Sharma (2005)** estimated the cost of cultivation of small millets (finger millet and barnyard millet) in the Chamba block of Tehri district, Uttarakhand. He reported the negative net returns over the total cost from finger millet as well as barnyard millet indicating the subsistence nature of their cultivation in the region. The net returns found to be positive only on variable cost and cost  $B_1$  (variable cost and rental value of land) for both millets. The per hectare cost of cultivation i.e. cost  $C_3$  were estimated to be highest on high hills (Rs.15336) followed by valleys (Rs.14171) and then mid hills (Rs.14176) for barnyard millet. The same was for finger millet i.e. the cost of cultivation was highest in high hills (Rs.18907) followed by valleys (Rs.16335) and mid hills (Rs.14176). The net returns per hectare over variable cost for barnyard millet were Rs.6099 in valleys, Rs.4255 in mid hills and Rs.4371 in high hills while for finger millet it was highest in high hills (Rs.7517) followed by mid hills (Rs.4158) and valleys (Rs.4177).

**Deshmukh et al. (2010)** conducted a study on 96 farmers in Beed district of Maharashtra using multistage sampling for the year 2008-09. The total cost of cultivation per quintal for pearl millet was Rs.512.31 on large farm followed by Rs.484.19 and Rs.476.80 on medium and small farm, respectively. The net profit was Rs.3170.86 on per hectare basis on small farm followed by Rs.2757.81 and Rs.1806.57 on medium and large farms, respectively.

**Adhikari (2012)** conducted a study to investigate the economics and marketing of finger millet in the peri urban area of Pokhara valley of Nepal. A sample size of 47 from Kalbang and 58 from Begnas were selected as main study sites. It was found that the cost of production (NR.23847.60/ha) and gross revenue (NR.24638.23/ha) were higher at Kalabang site than in Begnas with the price of finger millet NR.16.91/Kg and NR.17.35/kg in Kalabang and Begnas, respectively.

**Verma and Banafar (2013)** analyzed the economics of minor millets in Baster district of Chhattisgarh. The cost of cultivation i.e. cost-C for kodo, kutki and ragi was estimated to be Rs.3686.76, Rs.3521.12 and Rs. 4212.52 per hectare, respectively. The net income over cost-C for the same sequence of crop was Rs.139.62, Rs.115.24 and Rs. 6638.47 per hectare, respectively. Ragi was found to be giving higher income as compared to other millets.

**Chandrakanth and Suresh (2015)** analyzed the total factor productivity for finger millet in Karnataka state using the time series data for 20 years, from 1990-91 to 2009-10. The study revealed that the total factor productivity in ragi crop registered a substantial growth in Karnataka. Public research is one of the main sources of TFP growth in rainfed staple food crop like ragi. An additional investment of one rupee in ragi research generated additional income of Rs.26.84 and the marginal internal rate of return estimated to be 42.50 indicating investment in ragi research generated substantial returns to the society.

**Singh (2016)** analyzed the cost of cultivation of rice in Udham Singh Nagar district of Uttarakhand and found that the cost of cultivation per hectare on overall basis was Rs.57238.61/- and it was highest in large farms that is Rs.62943.20 while the net returns per hectare were highest for marginal farms (Rs.20990.27) followed by small (Rs.15539.48), medium (Rs.3868.33) and large farms (Rs.15219.48).

**Meena and kumar (2017)** estimated the cost and returns of pearl millet. The sample was drawn from 120 farmers from Chomu block having maximum area and production under pearl millet in Jaipur district of Rajasthan. Total cost of cultivation per hectare for small, medium and large size farms were Rs.19280.60, Rs.17702.70 and Rs.17432.60, respectively. The gross returns obtained per hectare by large farms were high (Rs.32300.00) as compare to medium and small farms (Rs.30600 and Rs.28900), respectively and the net returns per hectare were highest in large farms (Rs.14867.40) as compare to the medium and small size farms (Rs.12897.30 and 9619.40), respectively.

**Pusha et al. (2017)** analyzed the cost of production, returns and profitability of the major crops: sugarcane, wheat and paddy as they together accounted for more than 90% area of the gross cropped area in Deoria district in the Eastern region of Uttar Pradesh. The study indicated that per quintal cost of production for sugarcane crop was less than wheat (Rs.714.13) and paddy (Rs.614.93), on the other hand per hectare net return was highest for sugarcane (Rs.54956.01) than paddy (Rs.10870.71) and wheat (Rs.8614.32) crop. Sugarcane emerged as the most profitable crop among all the other crops.

**Sakamma et al. (2017)** examined the cost and returns from finger millet production in rural districts of Karnataka (Tumakuru, Hassan, Ramanagara and Bengaluru). The sample was drawn from 240 finger millet growing farmer, 120 irrigated and 120 rainfed. The study discovered that the average per hectare cost of

cultivation was higher in irrigated conditions (Rs.6469) as compared to rainfed situation (Rs.48575) and per hectare gross returns were Rs.4165 and Rs.67007 in rainfed and irrigated conditions, respectively. The analysis of net return from finger millet cultivation revealed that it was negative Rs.8410 per hectare under rainfed situation whereas the net return was Rs.2638 under irrigated situation.

**Tandel et al. (2018)** examined the economies of finger millet production in Valsad and Dang district of South Gujarat region. The study discovered that on per hectare basis the cost of cultivation (cost  $C_3$ ) was Rs.23727.48 and Cost  $A_1/A_2$ , cost  $B_1$ , cost  $B_2$ , cost  $C_1$  and cost  $C_2$  were Rs.9334.67, Rs.9370.09, Rs.13170.44, Rs.17770.09 and Rs.21570.44, respectively. The yield of main product was found to be 10.98 qt. per ha and that of by-product was 10 qt. per ha. The gross and net income realized in the cultivation of finger millet was estimated to be Rs.23752.15 and Rs.2181.71 per hectare, respectively indicating that finger millet cultivation was a profitable enterprise in the area.

**Adhikari (2019)** conducted a study to find out the profitability of off- season vegetables in kumaon region of Uttarakhand. The selected vegetables namely pea, potato, cabbage and french bean were found to be giving positive net profit over cost  $C_3$ . The cost of cultivation on per hectare basis was highest for potato (Rs.109608), followed by french bean (Rs.81535), pea (Rs.79434) and cabbage (Rs.68019). Pea was highest profitable crop followed by potato, french bean and Cabbage.

**Gowri and Shivakumar (2020)** worked out the cost of cultivation of millets mainly sorghum, bajra and maize in the different millet growing states across India. The study revealed that the cost of cultivation of sorghum and maize per hectare is highest in Tamil Nadu (Rs.42 957 and Rs.92710) followed by Maharashtra (Rs 40818 and Rs.72873) and Andhra Pradesh (Rs.39772 and Rs.67285). Similarly for bajra, Maharashtra stood first with costing of Rs.52311 followed by Gujarat state Rs.48281 per hectare.

**Lal et al. (2020)** estimated the cost and returns of pearl millet in the Sikar district of Rajasthan. The data was collected from 120 farmers in the district for the year 2019-20. On an average the cultivation of pearl millet on large farms gave the highest returns of Rs.12609.50 per hectare followed by medium and small farms (Rs.11327.80 and Rs.8979.30 per hectare), respectively. Cultivation decreased from 1.76 million hectares in 2000-01 to 1.37 million hectares in 2016-17, demonstrating a

downward tendency. Simultaneously, productivity has fallen from a high of 15.5 quintals per hectare in 2000-01 to 13.5 quintals per hectare in 2016-17.

### 2.3 Studies related to marketing of small millets

**Ong'ud (2013)** identified various marketing channels in marketing of pearl millet. Out of which channel III (Producers- Rural agents-Traders-Brokers-processors-Final consumers) turned out to be the most efficient channel followed by channel I (Producer- Rural agents- Traders-cum- small processors- Consumers), channel IV (Producers-Rural agent-Traders-Final consumers) and channel II (Producers-Traders-Brokers-Large processors-Consumers) with marketing efficiency index of 3.54, 3.36, 2.90 and 2.70, respectively. The findings of the study showed that pearl millet was profitable business despite the poor coordination between producers and intermediaries.

**Sharma et al. (2013)** studied data on market, prices received, and marketing costs, as well as price spread throughout the different value chains in the regulated markets of Jaipur, Jodhpur, and Nagpur for pearl millet and it was found that the producer share varied between 67 and 68 percent in consumer's rupee. On the one hand, village traders had a net share of 8.94 per cent, while commission agents had a share of 6-9 per cent. The net proportion of wholesalers, on the other hand, varied between 4 to 7 per cent.

**Makadia et al. (2014)** studied the marketing aspects of minor millets namely kodra (*Paspalum scrobiculatum*), finger millet (*Eleusine coracana*), and vari (*Panicum miliare*) with 120 sample farmers, 40 farmers for each crop, in the tribal and hilly Dang district of south Gujarat region. The total marketable surplus of kodra, finger millet and vari were 12.3, 27.01, and 159.23 quintals, respectively. The market margin was found highest in vari (Rs.314.15) then in finger millet (Rs.277.40) and kodra (Rs.152.15).

**Reddy et al. (2015)** studied the marketing of finger millet in kolar district of Karnataka for the period 2011-12. The study showed that three marketing channels were utilized by the finger millet growers for the sale of their produce. The channel involving village traders and commission agent were the most important and utilized by the majority of farmers. However, the producer's share in consumer's price was highest (82.30 %) in channel II involving sale through village traders and retailers followed by channel III (80 %) involving village traders and wholesalers and channel I (77.12%) involving wholesalers and commission agents.

**Naula (2017)** identified the different marketing channels and measured their efficiency for the selected varieties of tomato in Nainital district of Uttarakhand. The three varieties Abhinav, Himsona and US 2853 were selected for the study. They identified two main channels for the marketing of these varieties in the study area. The channels were Producer-Wholesaler commission agent-retailer-Consumer (I) and Producers-Retailer-Consumer (II). Channel II was found to be more efficient than the channel I as highest quantity of tomato was sold through channel II. The per quintal marketing cost incurred in channel I was highest for all the varieties, US 2853 (Rs.358.02/qt.) followed by Himsona (Rs.357.38/qt.) and Abhinav variety i.e. Rs.352.31/qt.

**Sahu and Sharma (2018)** investigated the marketing trends of three small millets cultivated in the Baster plateau zone of Chhattisgarh. The study was based on the primary data collected from 270 small millet growing farmers in 9 blocks of Bastar, Dantewada, Narayanpur and Bijapur districts. A total of 270 respondents were interviewed, out of which 187 farmers were cultivating Kodo millet, and 228 were involved in production of little millet and only 161 were growing finger millet. It was observed that majority of farmers growing Kodo millet (94.12%), little millet (97.37 %) and finger millet (91.30%) for their domestic consumption only. Remaining farmers were growing kodo millet (05.88 %), little millet (02.63%) and finger millet (08.70%) for both domestic consumption and marketing purposes. But none of the farmers was growing the millet for sole marketing purpose. It also indicated marketing pattern for maximum of Kodo millet sale from home to consumer (exchange method), little millet for sale in the local market, as well as finger millet for sale in the local market and also for exchange to the consumer.

**Adhikari (2019)** identified two major marketing channels i.e. Producer-wholesaler-cum-commission agent-retailer-consumer and producer-retailer-consumer through which the vegetables were disposed off. The majority of produce was sold through wholesaler- cum -commission agent. The study found that channel II was most efficient with marketing efficiency found to be 4.68, 3.84, 1.83 and 4.79% for pea, potato, cabbage and French bean, respectively and marketing efficiency for channel I for the same sequence of vegetables was 1.90, 1.52, 0.77 and 1.58%, respectively.

**Kusse et al. (2019)** conducted the study in the Omo Zone in South Nation Nationalities Peoples Region (Snnpr). Under the study, out of the total maize produced by sample farmers, 55.01 % (42870 quintals) of maize were supplied to the market and

the remaining 44.99 % held by farmers for consumption, repayment for borrowed seed and as source of seed for the next production year. The study also identified the main marketing agents through whom maize were channeled from producer to final consumers, such as farmer traders, urban assemblers, wholesalers, urban retailers, and processors. Accordingly, maize sample producers supplied 32.2% of their produce to local traders, 34.8% to urban assemblers, and 14.5% to processors.

**Jimoh *et al.* (2021)** analyzed the marketing of maize produce in the Irewole Local Government Area of Osun State. A total sample size of 120 respondents comprising of 40 maize wholesalers and 80 retailers, were randomly sampled from three purposively selected major maize markets. The findings of the study revealed that maize marketing was efficient and profitable, N 900 and N 1200 per 100 kg bag for wholesalers and retailers, respectively in the study area. The value of Gini Coefficients obtained for wholesaler and retailer were 0.31 and 0.31, respectively, indicating high level of competition in the industry.

**Indumathi *et al.* (2021)** analyzed the marketing performance of black pepper in Namakkal district of Tamil nadu. Channel III was found to be best for both producer and consumers as well, where producers received the maximum share of consumer's rupee (89.46%) and consumers purchased the produce at the low price of Rs.370/quintal. The total marketing cost was low in channel III (Rs.39/quintal) as compared to channel II (Rs.92/quintal) and channel I (Rs.74/quintal).

**Patel *et al.* (2021)** undertook a study to examine the marketing of small millets in south Gujarat. The findings revealed the price received by the producers with respect to producers share in consumer's rupee. It was found to be highest in channel I for Valsad district with producer receiving Rs.2500 per quintal which is 97.46 per cent share in the consumer's rupee while the farmer received the price of Rs.2200.00 per quintal which was 97.34 per cent share in consumer's rupee in dang district.

## **2.4 Studies related to constraints in production and marketing of small millets**

**Ong'ud, (2013)** identified the constraints during the marketing of pearl millets. The market was hindered due to factors like high processing cost (40%), limited supply of grains (15%) and low market demand for value added pearl millet products (15%). Despite these factors the major procurement constraints included lack of targeted

insurance products (56%), low level of precautionary savings and limited use of contract agreements (44%) and the last one was storage capacity (32%).

**Naula (2017)** reported that the high incidence of pest was the serious problem faced by the many tomato growers in Nainital district of Uttarakhand. Besides, this high pesticide costs, unavailability of labour were the other major problems faced by the respondents. The sample farmers revealed that as such there were problems in marketing of tomato. Among them, top 13 problems were considered for analysis and it was found that high cost of packaging material cost, transportation cost, post harvest losses, price fluctuation and high market margin were another problems expressed by them and a major cause for lower income.

**Sakamma et al. (2017)** identified and listed the problems faced by finger millet growers in the Karnataka. They were lack of remunerative price which fails to cover the cost of cultivation and provide reasonable profit margin to farmers' acts as disincentive to grow finger millet by farmers. Low yield combined with low price leads to reduced returns is one of the main reasons for farmers reducing area under finger millet.

**Singh et al. (2017)** examined the constraints in the production and marketing of pulses in Thekma block of district Azamgarh, Uttar Pradesh for the Agricultural year 2015-2016. A total of 100 sample farmers were interviewed and it was found that difficulties connected to a lack of knowledge and expertise were ranked first by 30.09 per cent of the respondents, followed by constraints in marketing second, availability of inputs in time third, and other problems ranked fourth by 32.15, 28.44, and 18.31 per cent of the respondents, respectively.

**Vasanthpriya et al. (2017)** carried out a study to find the constraints encountered by the little millet cultivating tribal farmers in the Tiruvannamalai district of Tamil nadu having maximum little millet production. A sample size of 120 farmers from 4 villages was selected in Jamunamarathur block of Tiruvannamalai district, Tamil nadu. The analysis revealed that in the technical constraints, high cost of labor (100.00%) and non-availability of labor (35.00%) ranked first and second, respectively. And also lack of good quality seeds (29.17%) and lack of adequate trainings (18.33%) were also perceived by the respondents. Again as regard to economic constraints, non-

availability of loans through Government, ranked first (20.00%), high cost of fertilizer ranked second (10.83%) and lack of price policy ranked third (2.50%). For marketing, more involvement of middle man in marketing (97.50%) was a major constraint felt by the respondents. Other than that, lack of proper marketing channel (23.33%) and lack of export facility (6.67%) were also considered as constraints by tribal farmers.

**Kumari *et al.* (2018)** conducted study in Jhunjhunu district of Rajasthan about the major constraints faced by the farmers in the marketing of pearl millet. The problem of high fluctuations in the prices (100%) and high cost of labour (100%) ranked first, high transportation cost (55%), malpractices by the middlemen (44%) ranked second and third, respectively, along with other problems related to lack of storage facilities at farm level (32%), lack of transportation facilities (28%) etc .

**Adhikari (2019)** investigated the problems of production and marketing of vegetables in kumaon hills of Uttarakhand. The farmers were asked to rank the constraints from a list of 19 pre-specified problems. The farmers ranked first order problem in production–shortage of irrigation water followed by crop damage due to incidence of pest and unavailability of quality seeds. The analysis showed the problem of high transportation cost and price fluctuations as the most severe marketing constraints.

**Kusse *et al.* (2019)** identified the constraints related to production and marketing of maize faced by the farmers and the traders in South Omo Zone in South Nation Nationalities Peoples Region (Snnpr). The farmers generally had problem related to unstable and lower prices. The other major production and marketing problems reported were rain failure, prevalence of American boll worm, lack of access to credit and market information, lack of alternative market opportunity, transportation problems and higher input price. The major marketing problems associated with the sample traders in the study area were capital shortage, lack of credit access, poor product quality of the commodity and unfair competition with unlicensed traders along with the absence of service road in the rural markets.

**Shanjeevika *et al.* (2020)** reported that major constraint revealed by the Garrett's ranking technique was poor quality of inputs with an average score of 66.18. Secondly, lack of credit interest (65.82), followed by lack of technical guidance from

the official (65.42), non-availability of recommended seed varieties (63.58) and lack of awareness on trainings, and recommended fertilizer doses.

**Sharma et al. (2020)** revealed that time constraint was delay in payment (ranked I) followed by natural calamities (rainfall occur during the harvesting and threshing) found 93.87 per cent and ranked II, unavailability of labor in crop season (79.60%) ranked III. The constraint related to unavailability of proper training and guidance was found 73.47 per cent and ranked IV. The technological problem in farm production (low productivity) and lack of literacy was found to be 71.42 and 69.38 per cent, ranking V and VI, respectively.

**Gyawali (2021)** undertook a study in the Eastern districts of Nepal to find out the major constraints faced by the millet growers. Weed has been a significant factor contributing the crop loss in many of the cereal crop along with poverty and food insecurity. Lack of research is one of the most constraints in the slow development of millet production in Nepal. Some of the other constraints are lack of awareness and changing climatic conditions.

**Jimoh et al. (2021)** conducted a study in Irewole Local Government Area of Osun State. The most serious constraint faced by wholesalers in marketing of maize is inadequate capital (40%), followed by insecurity (25%) and maize seasonality nature (15%). Retailers complained inadequate capital as the most serious problem followed by high rate of perishability of maize due to inefficient storage and preservative mechanism and price uncertainty.

### **Summary Comments on literature reviewed**

The review of literature described in the above sections reveals that numerous research studies have been carried out on economic analysis of production and marketing of small millets in India and abroad. It was evident as there were many problems reported related to production and marketing of small millets. The farmers had to encounter various constraints such as climatic conditions, lack of trained labour, high transportation cost, price fluctuations etc., which restrains the interest of farmers to invest in the millet farming and rather opt for cultivation of other cash crops to retain the maximum returns from them. Hence, there is a need to conduct regional studies on small millets particularly in those areas of the country having potential for millet production.

Chamoli district of Uttarakhand has a good hold on production of small millets and provides conducive climatic conditions for small millets' cultivation along with a promising future due to its potential in enhancing the income of hill farmers who come under marginal category. Therefore, it was thought pertinent to conduct a research study to estimate the trend analysis for area, production and productivity (APY), profitability through cost and returns analysis, marketing cost, marketing margin, marketing efficiency and constraints involved in the small millets' production and marketing in Chamoli district of Uttarakhand.

The study is expected to reveal the present state of scenario of small millets production and marketing in the area as well as also proposes some suggestions that should be adopted by the farmers for better productions, therefore, augmenting their returns. The purpose of the reviews is to get acquainted with various study tools and technique used in the earlier research works so as to adopt an appropriate methodology for the present study and to acquire the required knowledge from their findings.



*Profile of The  
Study Area*



The chapter deals with the agricultural and demographic features of the study area. This chapter is divided into two sections. The first section deals with the geographical and agricultural profile of the Uttarakhand state. It includes the statistical information related to demographics, agriculture, climate, land utilization pattern, cropping pattern etc. The second section deals with the general profile of the Chamoli district which includes geographical, demographic, and agricultural features.

### **3.1 Profile of the Uttarakhand state**

#### **3.1.1 Geographical features**

Uttarakhand is the 27<sup>th</sup> state of Republic of India situated in the Himalayan and sub- Himalayan region lies between 28° 44' & 31° 28' N Latitude and 77° 35' & 81° 01' East longitude. It was carved out of UP on 9<sup>th</sup> November 2000. The geographical area of the state is 53483 sq. km and topography of the state is largely hilly with large areas under snow cover and steep slopes.

Uttarakhand State comprises of two regions- the Garhwal and Kumaon region, 13 districts, 78 Tehsils and 95 community development blocks. The districts lying in **Garhwal region** are Uttarkashi, Chamoli, Pauri, Rudraprayag, Tehri, Dehradun & Haridwar and the remaining six in **Kumaon Region** are Udham Singh Nagar, Nainital, Almora, Pithoragarh, and Champawat & Bageshwar.

Uttarkashi, Chamoli and Pithoragarh districts of Uttarakhand share **International boundary** in the NW with China. In the east, the districts of Pithoragarh, Champawat and Udham Singh Nagar also share **International boundary** with **Nepal**. Uttarkashi and Dehradun share inter-state boundaries with **Himachal Pradesh** in the north-west, while Dehradun, Haridwar, part of Nainital and Udham Singh Nagar touches the boundary of **Uttar Pradesh** in the south.

The Garhwal Himalayas along with Kumaon has unique characteristics as it has Tibet in the north, Upper Gangetic Plains in the south and Eastern Himalayan provinces in the east.

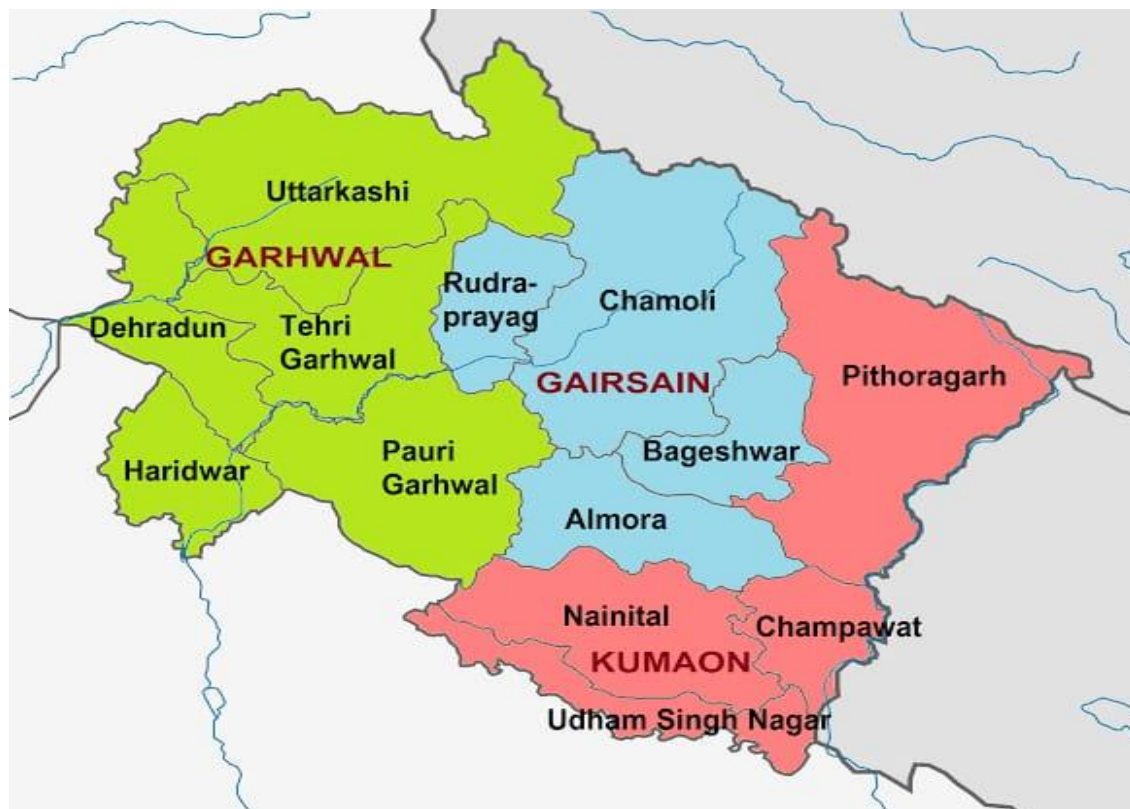
### 3.1.2 Administrative structure of Uttarakhand

Uttarakhand state is divided into two divisions, 110 tehsils, 18 sub-tehsils, 13 districts, and 95 development blocks for administrative purpose. Table 3.1 shows the administrative structure and local bodies of the state.

**Table 3.1: Administrative structure of Uttarakhand state**

Divisions	02
Tehsils	110
Sub-tehsil	18
Development blocks	95
Nyay panchayat	670
Gram panchayat	7791
Municipal corporation	08
Nagar palika Parishad	41
Nagar panchayat	42

Source: Uttarakhand at a glance, 2019-20



**Fig.1: Map of Uttarakhand state**

### 3.1.3 Demographic features

The total area of Uttarakhand is 53484 sq.km with a density of 189 per sq.km which is lower than the national average 382 per sq. km. As per 2011 census, the population of Uttarakhand is 10116752 of which male and female are 5154178 and 4962574, respectively. The total population has increased from figure 84.89 lakh in 2001 census to 1.01 crores in 2011 census. The total population of Uttarakhand forms 0.84 per cent of India in 2011. The total population growth in this decade was 19.17 per cent while in previous decade it was 19.20 per cent.

The sex ratio of Uttarakhand is 963 i.e. for each thousand male, which is below national average of 940 as per 2011 census. There has been an upward trend in the literacy rate of Uttarakhand and is 79.63 per cent as per 2011 census. Of that, male literacy stands at 88.33 per cent while female literacy is 70.70 per cent. While in 2001, literacy stood at 71.62 per cent of which male and female were 81.02 and 63.36 per cent literate, respectively.

The people of Uttarakhand are known as either Kumauni or Garhwali depending on their place of origin. There are total thirteen districts in Uttarakhand, out of which six are in kumaon region, namely Almora, Bageshwar, Champawat, Nainital, Pithoragarh and Udham Singh Nagar. The Garhwal region includes seven districts namely Dehradun, Haridwar, Tehri Garhwal, Uttarkashi, Chamoli, Pauri Garhwal and Rudraprayag.

**Table 3.2: Demographic statistics of Uttarakhand**

S. No.	Particulars	Unit	Statistics
1.	Total area	Sq. km.	53483
2.	Total population	Lakh	100.86
3.	Male	Lakh	51.38
4.	Female	Lakh	49.48
5.	Rural	Lakh	70.37
6.	Urban	Lakh	30.50
7.	Literacy	Per cent	78.82
8.	Male	Per cent	87.40
9.	Female	Per cent	70.01
10.	Population density	Per sq.km.	189

Source: Uttarakhand at a glance, 2019-20

### 3.2 Occupational distribution of the population in Uttarakhand (2011-12)

Agriculture is one of the main sectors of the economy in Uttarakhand. The people in plain districts have commercialized but subsistence farming is still practiced in the hilly regions of the state. In the table 3.3 it can be seen that only 1.99 per cent of individuals are engaged in household industry while farmers and agricultural labourers together accounted for 33.39 per cent of total work force.

**Table 3.3: Occupational distribution of the population in Uttarakhand.**

S. No.	Particulars	Unit	Total no.	Percentage of total worker
<b>A.</b>	<b>Main workers</b>	Lakh	28.71	<b>74.15</b>
1.	Farmers	Lakh	10.46	27.01
2.	Agricultural labourers	Lakh	2.47	6.38
3.	Household industry worker	Lakh	0.77	1.99
4.	Other workers	Lakh	15.01	38.77
<b>B</b>	<b>Marginal workers</b>	Lakh	<b>10.01</b>	<b>25.85</b>
1.	Farmers	Lakh	5.35	13.81
2.	Agricultural labourers	Lakh	1.56	4.03
3.	Household industry workers	Lakh	0.37	0.96
4.	Other workers	Lakh	2.73	7.05
5.	<b>Total workers</b>	<b>Lakh</b>	<b>38.72</b>	<b>100</b>

Source: Uttarakhand at a glance, 2019-20

### 3.3 Land use pattern

The land use pattern of Uttarakhand is given in table 3.4. The total reported area of Uttarakhand is 6001924 hectares, out of which 647788 ha is net sown area. The maximum area i.e. 63.50 per cent of total reported area was under forest cover.

**Table 3.4: Land use pattern in Uttarakhand (2018-19)**

S. No.	Particulars	Area (ha)	Per cent to total reported area
1.	Total reported area	6001924	100
2.	Area under forest	3811662	63.50
3.	Culturable waste land	328323	5.46
4.	Current fallow	88138	1.45
5.	Fallow land other than current fallow	88957	1.58
6.	Barren and un-culturable land	248963	4.13
7.	Land under non-agricultural use	185707	3.08
8.	Permanent pasture and other grazingland	207793	3.46
9.	Orchard and shrubs not included in netsown area	394593	6.56
10.	Net sown area	647788	10.78

Source: Uttarakhand at a glance, 2019-20

### 3.4 Land holding pattern

The distribution of land holdings in Uttarakhand is presented in table 3.5. The table shows that 74.72 per cent individuals had marginal land holdings, operating 38.02 per cent of the total area. Small farmers comprised 16.89 per cent with operation holding of 27.58 per cent. Medium & semi-farmers accounts for 8.27 per cent covering 31.33 per cent of the total area while only 0.11 per cent farmers belonged to large category with an operational land holding of 3.07 per cent of the total area.

**Table 3.5: Distribution of land holdings in Uttarakhand (2015-16)**

Category of farm	Number of holdings	Per cent to total holdings	Total area occupied (ha)	Per cent area occupied
Marginal holding (<1ha)	659000	74.72	284000	38.02
Small holding	149000	16.89	206000	27.58
Semi-medium & medium Holding	73000	8.27	234000	31.33
Large holding	1000	0.11	23000	3.07
<b>Total</b>	<b>882000</b>	<b>100</b>	<b>747000</b>	<b>100</b>

Source: Uttarakhand at a glance, 2019-20

### 3.5 Source of irrigation

The table 3.6 shows Uttarakhand has a gross irrigated area of 539651 hectares and net irrigated area of 322973 ha. The major area is covered by tube wells, accounting for 65.44 per cent of net irrigated area, followed by canals, covering 24.92 per cent of net irrigated area. The irrigation done through other wells covered 3.35 per cent of net irrigated area while other sources contribute 6.27 per cent of net irrigated area.

**Table 3.6: Source wise irrigated area in Uttarakhand**

S. No.	Sources of irrigation	Irrigated area (ha)	Per cent of netirrigated area
1.	Canals	80429	24.92
2.	Tube wells	211378	65.44
3.	Other wells	10835	3.35
4.	Tanks	79	0.02
5.	Other sources	20252	6.27
<b>6.</b>	<b>Net irrigated area</b>	<b>322973</b>	<b>100.00</b>

Source: Uttarakhand at a glance, 2019-20

### 3.6 Cropping pattern

The table 3.7 represents the cropping pattern of Uttarakhand. Cereal crops which comprises of paddy, wheat, maize, barley and minor millets constitutes 80.58 per cent of the total cropped area in the year 2019-20. Among these cereals, wheat and paddy has the highest area in Uttarakhand. Pulses constitute 6.43 per cent of the total cropped area of the state. Black gram is the major pulse grown in the state. Among oilseeds, rape seed and mustard has the highest share followed by sesamum (til).

**Table 3.7: Area under different crops in Uttarakhand**

S. No.	Crops	Area (ha)	Percentage of total cropped area
1.	Paddy	247002	26.69
2.	Wheat	315819	34.14
3.	Barley	24017	2.60
4.	Maize	21445	2.32
5.	Mandua	83988	9.07
6.	Sawan	46408	5.01
7.	Others	6966	0.75
<b>8.</b>	<b>Total cereals</b>	<b>745645</b>	<b>80.58</b>
9.	Total pulses	5933	6.43
<b>10</b>	<b>Total food grains</b>	<b>804978</b>	<b>87.01</b>
11.	Oilseeds	25137	2.71
12.	Sugarcane	91610	9.89
13.	Onion	3655	0.39
15.	Fodder	-	-
<b>16.</b>	<b>Total cropped area</b>	<b>925380</b>	<b>100</b>

Source: Uttarakhand at a glance, 2019-20

### 3.7 Status of area, production and productivity of small millets in Uttarakhand

Area, production and productivity of small millets in Chamoli district of Uttarakhand is presented in table 3.8 and table 3.9.

**Table 3.8: Area, production and productivity of finger millet in Uttarakhand**

S. No.	Year	Area (ha)	Production (metric ton)	Productivity (qt./ha)
1.	2011-12	114511	160034	13.98
2.	2012-13	113210	157792	13.94
3.	2013-14	108656	148803	13.70
4.	2014-15	107904	149033	13.81
5.	2015-16	105450	148705	14.10
6.	2016-17	106365	157402	14.80
7.	2017-18	101504	138836	13.68
8.	2018-19	94004	114457	12.18
9.	2019-20	83988	120083	14.30
10.	<b>2020-21</b>	<b>88577</b>	<b>129244</b>	<b>14.59</b>

Source: District statistical bulletin, Chamoli

Table 3.8 shows the area, production and productivity of finger millet for a period of 10 years i.e. from 2011-12 to 2020-21.

**Table 3.9: Area, production and productivity of barnyard millet in Uttarakhand**

S. No.	Year	Area (ha)	Production (metric ton)	Productivity (qt./ha)
1.	2011-12	57371	76579	13.35
2.	2012-13	56870	75929	13.35
3.	2013-14	54744	71537	13.07
4.	2014-15	53586	74273	13.86
5.	2015-16	50656	67145	13.26
6.	2016-17	51410	72325	14.07
7.	2017-18	46626	63483	13.62
8.	2018-19	48151	62996	13.08
9.	2019-20	46408	64093	13.81
10.	2020-21	42061	62266	14.80

Source: District statistical bulletin, Chamoli

Table 3.9 represents the area, production and productivity of barnyard millet for a period of 10 years i.e. from 2011-12 to 2020-21.

**Table 3.10: District wise area, production and productivity of finger millet in Uttarakhand for the year 2020-21**

S. No.	District	Area (ha)	Production (metric ton)	Productivity (qt./ha )
1.	Chamoli	10001	16094	16.09
2.	Dehradun	458	861	18.80
3.	Haridwar	0	0	0
4.	Pauri Garhwal	13514	19463	14.40
5.	Rudraprayag	7097	10250	14.44
6.	Tehri	8116	14790	18.22
7.	Uttarkashi	4831	8543	17.68
8.	Almora	26009	31001	11.92
9.	Bageshwar	6087	8129	13.35
10.	Champawat	3402	5909	17.37
11.	Nainital	1200	1738	14.48
12.	Pithoragarh	7860	12461	15.85
13.	Udham singh nagar	2	5	25.00
	<b>Total</b>	<b>88577</b>	<b>129244</b>	<b>14.59</b>

Source: District statistical bulletin, Chamoli

Table 3.10 shows the area, production and productivity of finger millet district wise in the state for the year 2020-21.

**Table 3.11: District wise area, production and productivity of barnyard millet in Uttarakhand for year 2020-21.**

S. No.	District	Area (ha)	Production (metric ton)	Productivity (qt. /ha )
1.	Chamoli	3556	5408	15.21
2.	Dehradun	123	188	15.28
3.	Haridwar	0	0	0
4.	Pauri Garhwal	8409	11468	13.64
5.	Rudraprayag	3648	5491	15.05
6.	Tehri	10276	17581	17.11
7.	Uttarkashi	1433	2910	20.31
8.	Almora	12481	15970	12.80
9.	Bageshwar	217	383	17.65
10.	Champawat	665	1120	16.84
11.	Nainital	147	180	12.24
12.	Pithoragarh	1106	1567	14.17
13.	Udham singh nagar	0	0	0
	<b>Total</b>	<b>42061</b>	<b>62266</b>	<b>14.80</b>

Source: District statistical bulletin, Chamoli

Table 3.11 shows the area, production and productivity of barnyard millet district wise in the state for the year 2020-21.

### 3.8. Profile of Chamoli district

#### 3.8.1 Geographical features

Chamoli district is one of the hilly districts of the state that is surrounded by Uttarkashi in north-west, Pithoragarh in south-west, Almora in south-east, Rudraprayag in south-west and Tehri Garhwal in the west. Chamoli district is situated in the Himalayan region of Uttarakhand between north latitudes 29° 55' 00'' & 31° 03' 45'' and east longitude 79° 02' 39'' & 80° 03' 29''.

#### 3.8.2 Administrative divisions

The administrative set up of the district is presented in the table 3.12. The district headquarter is in Gopeshwar. The district consists of twelve tehsils viz. Chamoli, Joshimath, Pokhari, Karanprayag, Gairsain, Tharali, Dewal, Narayanbagar, Adibadri, Jilasu, Nandprayag, and Ghat. The district was created in 1960 out of the erstwhile Garhwal district and named as Chamoli.

**Table 3.12: Administrative Divisions**

S. No.	Description	Particulars
1.	District head quarter	Gopeshwar
2.	Tehsils	12
3.	Sub-tehsils	-
4.	Blocks	9
5.	Nyaya Panchayat	39
6.	Nagar Palika Parishad	8
7.	Gram Panchayat	607
8.	Total villages	1244

Source: Krishi Sankhiyiki Patrika, 2019-20



Fig.2: Map of Chamoli district

### 3.8.3 Demographic features

The demographical features of the district are shown in table 3.13. Chamoli district is the second largest district of Uttarakhand state, having a total area of 8030 sq. km. and a population of 309161 lakh which comprises 193990 male and 197610 female. The literacy rate of district is 82.65 per cent which is 4 per cent higher than that of the state's literacy rate.

Table 3.13: Demographic features of Chamoli district

S. No.	Particulars	Units	Statistics
1.	Total area	Sq. km	8030
2.	Total Population	Lakh	3.9161
3.	Rural	Lakh	3.0147
4.	Urban	Lakh	0.8113
5.	Literacy	Per cent	82.65
6.	Male	Per cent	93.4
7.	Female	Per cent	72.32
8.	Population density	Per sq. km	49

Source: Krishi Sankhiyiki Patrika, 2019-20

### **3.8.4 Agro-climatic features**

#### **a) Climate and rainfall.**

The climate of the district very largely depends on altitude as the elevation of the district ranges from 800 m to 8000 m above sea level. The winter season starts from mid of November and goes up to March and January being the coldest month in the district which brings down the temperature after which the temperature begins to rise till June or July. Snow accumulation in valleys is considerable. This is followed by monsoon season with the rainfall being heaviest from June to September when 70 to 80 percent of the annual precipitation is accounted for in the southern half of the district and 55 to 65 percent in the northern half. The temperature recorded at the meteorological observatories in the district show that the highest temperature was 34 degree Celsius and lowest zero degree Celsius. Rain gauging stations put up at seven locations by Meteorological department of Govt. of India, represent the settled land mass of Chamoli district.

#### **b) Soils.**

The soil types are controlled by the topography and rock types. The soils of the Chamoli district can be classified into Lithic/Typic cryothernts. These have developed from rocks like granite, schist, gneiss, phyllites, shales, slate etc under cool and moist climate. These soils are in general under sparse vegetation. Very steep to steep hills and Glacio-fluvial valleys are dominantly occupied with very shallow to moderately shallow, excessively drained, sandy skeletal to loamy –skeletal, neutral to slightly acidic with low available water capacity soils. The broader valley slopes dominantly have deep, well drained, fine loamy, moderately acidic and slightly stony soils. Soils, in general, are of high fertility and respond well to fertilizer application.

### **3.8.5 Occupational distribution of the population**

Most of the working population in the district is seemed to be engaged in agriculture for their livelihood. Farmers and agricultural labourers together accounted for 39.06 per cent of work force. The table also shows that only 1.72 per cent individuals are involved in household industry work while 36.39 per cent were marginal workers (Table 3.14).

**Table 3.14: Occupational distribution of population in Chamoli district (2011-12)**

S. No.	Particulars	Total number	Percentage of total worker
1.	Total workers	180940	100.00
2.	Farmers	69612	38.47
3.	Agricultural labourers	1072	0.59
4.	Household industry workers	3115	1.72
5.	Marginal workers	65825	36.39
6.	Other workers	41316	22.83

Source: Krishi Sankhiyiki Patrika, 2019-20

### 3.8.6 Land utilization pattern

Table 3.15 depicts the land use pattern in Chamoli district for the year 2018-19. The reported area of the district was 867698 hectares, out of which the area under forest is 506100 hectares which is about 58.32 per cent of the total reported area. The net sown area is 31250 hectares which accounts 3.60 per cent of the total reported area. Land not available for cultivation is 107473 hectares and cultivable barren land is 11606 hectares.

**Table 3.15: Land utilization pattern in Chamoli district (2018-19)**

S. No.	Particulars	Area (ha)	Percentage of total reported area
1.	Total reported area	867698	100
2.	Area under forest	506100	58.32
3.	Cultivable barren land	11606	1.34
4.	Current fallow	2208	0.25
5.	Other fallow	1056	0.13
6.	Non-cultivable barren land	90811	10.46
7.	Land under non-agricultural use	16662	1.93
8.	Permanent pasture and other grazing land	47760	5.50
9.	Orchard and shrubs not included in net sown area	144311	16.63
10.	Net sown area	31250	3.60
11.	Area sown more than once	15934	1.84

Source: Krishi Sankhiyiki Patrika, 2019-20

### 3.8.7 Distribution of land holding pattern

The perusal of the table 3.16 represents the distribution of land holdings in the Chamoli district. The total area operated by all the farm categories is 37255 hectares while the average size of land holding is 0.79 hectare. Small and marginal farmers accounts for 93.09 per cent of the land holdings and share roughly around 74.27 per cent of the operated area in the district. Only 0.28 per cent of the area is operated by the large farmers. The average size of the land holding of the large farmers is 10.6 ha. The average size of operated area of all farm categories classes is declining year by year which shows increase in the fragmentation of land holdings.

**Table 3.16: Distribution of land holdings in Chamoli district**

Category of Farmer	Number of holdings	Per cent of total holdings	Total operated area (ha)	Per cent of operated area	Average size of land holding(ha)
Marginal holdings(<1 ha)	35264	75.60	16459	44.17	0.46
Small holdings(1-2 ha)	8159	17.49	11216	30.10	1.37
Semi-medium & medium holdings(2-10 ha)	3208	6.89	9474	25.45	2.95
Large holdings(> 10 ha)	10	0.02	106	0.28	10.6
<b>Total</b>	<b>46641</b>	<b>100</b>	<b>37255</b>	<b>100</b>	<b>0.79</b>

Source: Department of Agriculture & Farmers Welfare, Agriculture Census 2015-16

### 3.8.8 Source of irrigation

Source wise irrigated area of the district is presented in table 3.17. The major sources of irrigation in the district are springs, gad, gadheras and rivers which collectively accounts for 68.14 per cent of net irrigated area followed by canals and tube wells covering around 20.70 and 11.16 per cent of the net irrigated area.

**Table 3.17: Source wise irrigated area in Chamoli district**

S. No.	Sources of irrigation	Net irrigated area (ha)	Percentage of net irrigated area
1.	Canals	368.98	20.7
2.	Tube wells	Government	199
		Private	-
3.	Others	1215	68.14
4.	<b>Total</b>	<b>1782.98</b>	<b>100</b>

Source: Krishi Sankhiyiki Patrika, 2019-20

### 3.8.9 Cropping pattern

Cropping pattern of the district for the year 2019-20 is shown in the table 3.18. The total cropped area of the district is 48096 hectares. The total area under cereals and small millets is 89.15 per cent, pulses 4.85 per cent, and oilseeds 2.39 per cent and under potato 3.21 per cent. Wheat and paddy are the two crops which hold around 51.25 per cent area among cereals where as small millets accounts for 33.5 per cent of total cropped area. Among oilseeds rapeseed/mustard is the leading crop in the district.

**Table 3.18: Cropping pattern followed in Chamoli district**

S. No.	Crops	Area (ha)	Percentage of totalcropped area
1.	Wheat	13085	27.20
2.	Paddy	11570	24.05
3.	Barley	1872	3.8
4.	Maize	234	0.48
5.	Mandua (finger millet)	9437	19.62
6.	Sawan (barnyard millet)	5457	11.34
7.	Ramdana	1224	2.54
8.	Total cereals	42879	89.15
9.	Total pulses	2333	4.85
10.	Total food grains	45212	94
11.	Total oilseeds	1150	2.39
12.	Potato	1544	3.21
13.	Turmeric	12	0.03
14.	Onion	97	0.20
15.	Ginger	3	0.01
16.	Garlic	78	0.16
17.	<b>Total</b>	<b>48096</b>	<b>100</b>

Source: Krishi Sankhiyiki Patrika, 2019-20

### 3.8.10 Infrastructural and institutional arrangements

**Table 3.19: Infrastructural and institutional arrangements in Chamoli district**

S. No.	Particulars	Number
1.	Railway station	0
2.	Bus station	239
3.	Post office	266
4.	Nationalized bank branches	57
5.	Rural bank branches	13
6.	Co-operative bank branches	21
7.	Schools	
7.1	Junior basic school	929
7.2	Senior basic school	194
7.3	Higher secondary school	240
7.4	Degree college	4
7.5	University	0

Source: Krishi Sankhiyiki Patrika, 2019-20



# *Methodology*



This chapter deals with conceptual framework and detailed description of the methodology followed for achieving the objectives of the study. This section has been divided into three sub-sections. First section deals with sampling design and the second section covers data and its sources while the third section deals with the analytical tools used in the present study for analysis of the data.

### **4.1 Sampling Design**

The present study was conducted in Chamoli district of Uttarakhand state for the agriculture year 2020-21 using multi-stage random sampling technique. Chamoli district was purposively selected as small millets are extensively grown in the district and is also surplus in small millets production with a major share in total production of the state and also the land holding is quite satisfactory. The blocks were selected as it was convenient to procure authentic data required for the study while the villages and sample farmers were selected randomly.

#### **4.1.1 Selection of blocks in the study area**

Chamoli district comprises of nine blocks namely: Joshimath, karanprayag, Dasholi, Ghat, Narayanbagar, Gairsain, Tharali, Dewal, and Pokhari. Out of these, two blocks, Ghat and Pokhari were selected in the second stage of sampling to conduct the proposed study as it was convenient to procure authentic data required for the study.

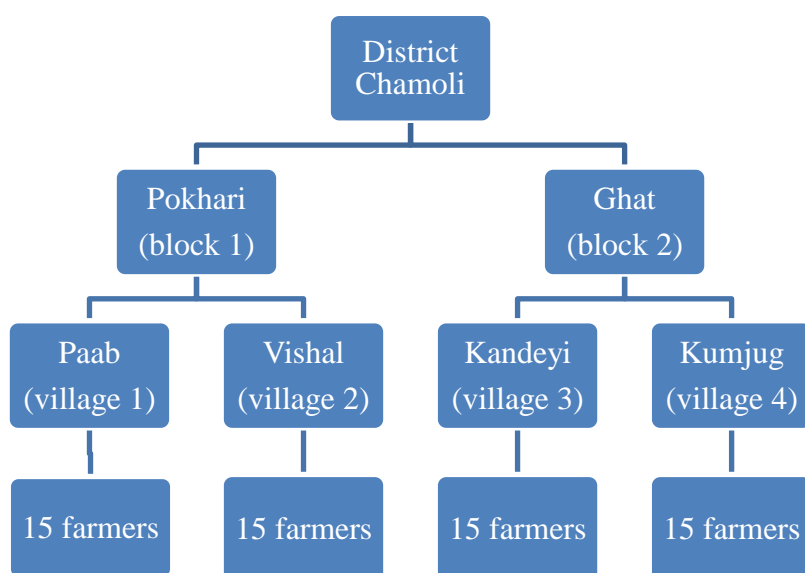
#### **4.1.2 Selection of villages**

In the third stage of sampling, a list of villages falling under both the blocks was prepared in consultation with the Block Development Officers and Revenue department for the selection of villages. The villages were stratified into two groups depending upon altitude i.e., (i) high hills (above 1500 M MSL), (ii) mid hills (1000-1500 M MSL). Two villages (each from mid hills and high hills) in each block were selected randomly by applying simple random sampling technique. The selected villages were Pab (high hills) and Vishal (mid hills) from Pokhari block and Kandeyi (mid hills) and Kumjug (high hills) from Ghat block. A total of four villages were selected for the present study.

M MSL\* Mean meters from mean sea level

### 4.1.3 Selection of farmers

The district is mostly dominated by small and marginal farmers with an average operated land holding of 0.79 ha (**Agriculture Census 2015-16**). The size of land holding of farmers in the selected villages were substantially lower than the district average, therefore, the small millet growing farmers were selected randomly. A list of small millet growers from each selected village was prepared with the help of Gram Pradhan and Revenue officials. Fifteen farmers from each village were selected randomly therefore, a total sample size of 60 small millet growers was obtained from the four selected villages.



## 4.2 Data source

Both, primary as well as secondary data was collected to attain the objectives of the present research under investigation.

### 4.2.1 Primary data

Primary data pertaining to the year 2020-21 was collected from the respondents through personal interview method using a well structured pre-tested survey schedule. In order to get better co-operation and reliable data from the farmers, the purpose of the study was clearly explained to them prior to the interview.

The primary data related to socio-economic conditions of small millet growers, cultivation aspects such as yield, costs and returns and disposal of the produce for marketing were collected. In addition, information on production and marketing constraints faced by the farmers in small millet cultivation was also ascertained.

### 4.2.2 Secondary data

Secondary data were obtained for a period of ten years (2009-10 to 2018-19) through various published sources such as Block Development Offices (BDO), District Statistical Office, District Agriculture Office, Directorate of Agriculture, research papers, journals, publications, books etc. Besides, this some basic information was also collected from different journals and publications.

### 4.2.3 Selection of market intermediaries

The markets were selected on the basis of sample farmer's preference to sell their produce. To collect market information with respect to marketing channels, marketing costs and margins, price spread and producer's share in consumer's rupee, 4 market intermediaries of each category i.e. village trader, wholesaler, retailer, were selected from the markets.

## 4.3 Analytical Framework :

A brief description of the analytical framework to achieve the objectives has been presented in the following sub section.

### 4.3.1 Compound annual growth rate (CAGR) in area production and productivity of small millets

To achieve the first objective that is to estimate the growth rate, Compound annual growth rate (CAGR) was used.

CAGR is the mean annual growth rate of an investment over a specific period of time for more than one year.

$$Y = ab^t$$

Where,

Y= Area / production of millet for the year t

a = constant

b = Regression coefficient that shows the rate of change or growth rate in a series

t = time variable in year (1, 2, 3.....n)

CAGR was computed using log linear function on the time series data.

Log Y= log a + t (log b)

Compound annual growth rate was computed as follows

$$\text{CAGR (per cent)} = [\text{antilog}(\log b) - 1] \times 100$$

Student's **t-test** was used to test the significance of regression coefficient.

#### **4.3.2 Costs of and returns from small millets cultivation**

To achieve the second objective i.e. the cost of and returns from small millet cultivation, the cost concepts specified by CACP was applied. The CACP cost concepts are elaborated under here:

**a) Cost concepts :**

**Cost A<sub>1</sub>:** It includes:

- (a) Value of hired human labor
- (b) Value of hired bullock labor
- (c) Value of owned bullock labor
- (d) Value of owned machinery labor
- (e) Hired machinery charges
- (f) Value of seed (both farm produced and purchased)
- (g) Value of insecticides and pesticides
- (h) Value of manure (owned and purchased)
- (i) Value of fertilizers
- (j) Depreciation on implements and farm buildings
- (k) Irrigation charges
- (l) Land revenue, cesses and other taxes
- (m) Interest on working capita
- (n) Miscellaneous expenses.

**Cost A<sub>2</sub>:** Cost A<sub>1</sub>+ rent paid for leased in land

**Cost B<sub>1</sub>:** Cost A<sub>1</sub> + interest on value of owned fixed capital assets (excluding land)

**Cost B<sub>2</sub>:** Cost B<sub>1</sub> + rental value of owned land (net of land revenue) and rent paid for leased-in land

**Cost C<sub>1</sub>:** Cost B<sub>1</sub> + imputed value of family labor

**Cost C<sub>2</sub>:** Cost B<sub>2</sub> + imputed value of family labor

**Cost C<sub>2</sub>\*:** Cost C<sub>2</sub> adjusted to take into account valuation of human labor at market rate or statutory minimum wage rate whichever is higher

**Cost C<sub>3</sub>:** Cost C<sub>2</sub>\*+ value of management input at 10 per cent of total cost (C<sub>2</sub>\*)

**Fixed cost:** It includes the depreciation cost and interest on fixed capital.

**Variable cost:** Variable cost used in the study includes-

- Cost of labor, cost of material inputs (seeds, fertilizer, manures), etc.
- Interest on working capital (7 % per annum)

**Estimation of Returns:**

i) **Gross returns:**  $GR_i = TP_i \times P_i$

Where,

$GR_i$  = Gross return from  $i^{th}$  crop

$TP_i$  = Total production of  $i^{th}$  crop

$P_i$  = Price received by the producer for the  $i^{th}$  crop

ii) **Net return (profit) = Gross returns – Total cost**

Net returns over various costs were calculated by reducing the different costs from gross returns.

**Valuation of inputs and output**

Inputs and outputs were quantified and valued as described below:

a) **Human labour:** Human labour- both family and hired was measured in terms of man-days of eight hours.

**I. Hired human labour:** The wage for hired labour was evaluated as the actual amount paid in cash and kind. In the study area it was found that the average wage rate of hired labour (Rs/ha) for different operations was same.

**II. Family labour:** The imputed value of family labour was worked out on the basis of hired labour charge.

**b) Bullock labour charges**

**I. Hired bullock labour:** The charges for hired bullock labour were estimated at the actual amount paid for hiring the bullocks.

**II. Owned bullock labour:** The charges for owned bullock labour were accounted for as per the rates of hired bullocks prevailing in the locality.

**c) Seed:** Mostly the seeds were home produced and valued at the price prevailing in the locality at the time of sowing.

**d) Manure and fertilizer:** Farm produced manures were valued at the prevailing locality prices. Purchased manure and fertilizers were valued at the actual amount paid plus transportation charges.

**e) Plant protection chemicals:** Plant protection chemicals were valued at the actual amount paid plus the transportation and other charges.

**f) Irrigation charges:** Irrigation charges were taken as the actual amount paid for irrigating the crop.

**g) Interest on working capital:** It was calculated @ 7.50 per cent for half of the duration of the crop on the sum total of paid out cost.

**h) Depreciation:** Depreciation was calculated for the fixed capital using straight line method. The annual depreciation of the farm was then allotted to the concerned crop in proportion to the area under the crop as ratio of total cropped area.

$$\text{Annual amount of depreciation} = \frac{\text{original cost of the asset} - \text{junk value}}{\text{useful life of the asset}}$$

**i) Interest on fixed capital:** Rate of interest used was @ 8 per cent per annum. After calculating the total interest, it was apportioned in proportion to the area under the crop.

### **4.3.3 Marketing Channels marketing costs, margins and marketing efficiency of small millets**

The marketing cost, marketing margin, price spread, producer's share in consumer's rupee in disposing off the produce were calculated for across channel I and channel II, separately.

#### 4.3.3.1 Marketing cost

It refers to the cost incurred either in cash or in kind by the producers and other intermediaries involved in the sale and purchase of the produce till it reaches to the ultimate consumer. Total marketing cost can be calculated as –

$$C = C_f + C_{m1} + C_{m2} + \dots + C_{mi}$$

Where,

C = Total cost of marketing of small millets

$C_f$  = cost incurred by the producer or farmer

$C_{mi}$  = Cost incurred by the  $i^{\text{th}}$  middle-man in the process of buying and selling of small millets

#### 4.3.3.2 Marketing margin

Marketing margin involves the cost or remuneration received by the intermediaries in moving the produce in a marketing channel from point of production to point of consumption.

The marketing margin was expressed on the given measures –

- 1) Absolute marketing margin ( $A_{mi}$ ) =  $P_{Ri} - (P_{pi} + C_{mi})$
- 2) Percent marketing margin ( $P_{mi}$ ) =  $P_{Ri} - (P_{pi} + C_{mi}) / P_{Ri} \times 100$
- 3) Mark-up margin ( $M_i$ ) =  $P_{Ri} - (P_{pi} + C_{mi}) / P_{pi}$

Where,

$P_{Ri}$  = Selling price per unit

$P_{pi}$  = Buying price per unit

$C_{mi}$  = Marketing cost incurred per unit

#### 4.3.3.3 Price spread

It is the difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of produce. It is calculated as follows –

$$\text{Price spread} = \{(P_c - P_f) / P_c\} \times 100$$

Where,

$P_c$  = Price paid by the consumer

$P_f$  = Price received by the producer

#### 4.3.3.4 Producer's share in consumer's rupee

It refers to the price received by the farmer expressed as a percentage of the retail price i.e. the price paid by the consumer for different millets symbolically.

$$\text{Producer's share in consumer's rupee (P}_s\text{)} = \frac{\text{Price received by the producer (Pf)}}{\text{price paid by the consumer (Pc)}} \times 100$$

#### 4.3.3.5 Marketing efficiency

It refers to the degree of market performance i.e., effectiveness with which a market structure performs its designated functions. Marketing efficiency can be calculated using Acharya's formula which is given below:

$$\text{MME} = \frac{\text{FP}}{\text{MC} + \text{MM}}$$

Where,

MME = Marketing efficiency

MC = Total marketing cost

MM = Total net marketing margin

#### 4.3.4 Constraints faced by the producers in production and marketing of small millets

Garret ranking technique was used for ranking the constraints faced by the farmers and marketing intermediaries. A list of constraints was prepared and the respondents were asked to rank the particular constraint. In this way every respondent was given a score for every constraint and the mean score for every constraint given by every farmer was compared with Garret's ranking table. Then the constraints were prioritized. Formula for Garret's ranking is as follows:

$$\text{Per cent position} = \frac{100(\text{R}_{ij} - 0.5)}{N_j}$$

Where,

$R_{ij}$  = rank given for the  $i^{\text{th}}$  constraint by the  $j^{\text{th}}$  individual.

$N_j$  = No .of constraints ranked by the  $j^{\text{th}}$  individual.

The percent position of each rank was converted to scores by referring a table given by Garret and Woodworth (1969). For each factor the scores of individual respondent were summed up and were divided by the total number of respondents from whom scores were gathered. The mean score for all the factors was arranged in descending order and thus, rank was assigned to the problems.



*Results*  
*and*  
*Discussion*



The results of the study are presented and discussed in this chapter. The first section deals with the socio economic conditions of the sample farmers-respondents while the section 5.2 was associated with the estimation of compound annual growth rate (CAGR) in area, production and productivity of small millets. Section 5.3 deals with the computation of cost and returns from small millets cultivation in surveyed area. Section 5.4 covers the results related to the marketing pattern of small millets including marketing cost, market margins, price spread and producer's share in consumer's rupee. Finally, the last section of this chapter covers the severity of constraints faced by the farmers in production and marketing of small millets which is described in section 5.5.

## **5.1 Profile of sample farmers**

### **5.1.1 General characteristics of sample farmers**

Table 5.1 shows the general characteristics of sample farmers in Chamoli district. The study covers 60 small millet growers from four selected villages of two blocks in the district. The perusal of the table shows that on an overall average basis land holding of sample farmers was 0.43 ha, out of which the average area occupied under finger millet and barnyard millet were 0.10 and 0.13 ha, respectively. It was found that the average age of household head was 40.67 years. The average number of members per family was found to be 5.06 with agriculture & allied sector being the major source of income for livelihood in the study area.

**Table 5.1: General characteristics of sample farmers**

<b>S. No.</b>	<b>Particulars</b>		<b>Numerals</b>
1.	Total number of farmers		60
	Average age of household head (years)		40.67
3.	Family size (number)		5.06
4.	Main source of income		Agriculture & allied sector
5.	Average land holding (ha)		0.43
6.	Average area under small millet cultivation	Finger millet	0.10
		Barnyard millet	0.13

### 5.1.2 Educational status of sample farmers

Table 5.2 represents the distribution of sample farmers according to their educational level in the selected villages of the districts. The majority of the farmers belonged to the high school/secondary level of education which is 40 per cent to total farmers followed by primary (35%), illiterates (16.67%) and graduate (8.33%) on an overall basis. In Pokhari block, maximum farmer-growers were under high school /secondary and graduate level of education, while on the other hand, majority of farmers belonged to primary level and illiterates in Ghat block.

**Table 5.2: Educational status of sample farmers.** (Numbers)

S. No.	Level of Education/ Blocks/Villages	Pokhari		Ghat		Overall
		Paab	Vishal	Kandeyi	Kumjug	
1.	Illiterate	2 (13.34)	-	3 (20.00)	5 (33.33)	10 (16.67)
2.	Primary	4 (26.66)	4 (26.67)	5 (33.33)	8 (53.33)	21 (35.00)
3.	High school/ secondary	7 (46.67)	10 (66.67)	5 (33.33)	2 (13.34)	24 (40.00)
4.	Graduate	2 (13.33)	1 (6.66)	2 (13.34)	-	5 (8.33)
5.	Total	15 (100.00)	15 (100.00)	15(100.00)	15 (100.00)	60 (100.00)

Figures in parentheses indicate percentage to total

### 5.1.3 Occupational distribution of sample farmers

Table 5.3 shows the distribution of sample farmers according to their occupation in the study area. The analysis revealed that agriculture & allied sector was the main occupation of 65 per cent farmers. On the other hand, the services/jobs in Government or private sector covered 18.34 per cent respondents to total surveyed farmers in the target area followed by 16.66 per cent in other sector which included daily laborers, business, contractors, shopkeepers etc.

**Table 5.3: Occupation wise-distribution of sample farmers** (Numbers)

S. No.	Occupation/Blocks/Villages	Pokhari		Ghat		Overall
		Paab	Vishal	Kandeyi	Kumjug	
1.	Agriculture & allied sectors	11 (73.34)	9 (60.00)	11 (73.34)	8 (53.33)	39 (65.00)
2.	Services/jobs	2 (13.33)	5 (33.34)	3 (20.00)	1 (6.67)	11 (18.34)
3.	Others	2 (13.33)	1 (6.66)	1 (6.66)	6 (40.00)	10 (16.66)
4.	<b>Total</b>	<b>15 (100.00)</b>	<b>15 (100.00)</b>	<b>15 (100.00)</b>	<b>15 (100.00)</b>	<b>60 (100.00)</b>

Figures in parentheses indicate percentage to total

### 5.1.5 Average annual income of millet growers.

The distribution of farmer-respondents in three different income-groups is depicted in the table 5.4. It shows that the main source of income was agriculture & allied sector for 61.67 per cent farmers who were mainly engaged in crop and livestock husbandry, orchard etc. followed by regular or contractual services/jobs and other sources that accounted for 20.00 and 18.33 per cent, respectively, in surveyed area. The majority of farmers (77.50%) in agriculture & allied sectors belonged to the annual income group of Rs.2-4 lakh while in other sources, under less than Rs.2 lakh income group, 47.06 per cent farmers- respondents were covered in the study area (Table 5.4.). A little proportion of farmers (3%) was under Rs.4-6 lakh income group having other sources of income.

**Table 5.4: Distribution of income from all sources of sample farmers.**

(Numbers)

Occupation/income group	Less than Rs. 2 lakh	Rs. 2-4 lakh	Rs. 4-6 lakh	Overall
<b>Agriculture &amp; allied Sector</b>	6 (35.29)	31 (77.50)	-	37 (61.67)
<b>Services / Jobs**</b>	3 (17.65)	9 (22.50)	-	12 (20.00)
<b>Others sources*</b>	8 (47.06)	-	3 (100.00)	11 (18.33)
<b>Total</b>	17 (100.00)	40 (100.00)	3 (100.00)	60 (100.00)

\* includes shops, contracts, non-farm laborers, professionalism etc.

\*\* Regular or part-time services in government or private sectors.

Figures in parentheses indicate percentage to total

### 5.1.5 Distribution of livestock and poultry

The table 5.5 represents the livestock and poultry population in the surveyed area. The total livestock population was 234 which comprises of all small and large ruminants while the population of poultry birds were 70 only and were in Pab, Vishal and Kandeyi villages in the district. There was no poultry bird found in the Kumjung village. The major proportion of livestock comprises bullock and buffalo accounted for 31.63 and 28.20 per cent, respectively, followed by mules, goats and cattle. It can be seen that mule accounted for 15.81 per cent of the total livestock population while surpassing the other animals such as goats (13.68%) and cattle (10.68%). Mules are very useful livestock in hills and mostly used for transportation of different type of goods in terrain/sloppy hills.

**Table 5.5: Distribution of livestock and poultry** (numbers)

S. No.	Animals /Blocks/ villages	Pokhari		Ghat		Overall
		Paab	Vishal	Kandeyi	Kumjug	
1.	Cattle	5 (10.00)	6 (10.90)	8 (16.32)	6 (7.50)	25 (10.68 )
2.	Bullock	18 (36.00)	26 (47.28)	14 (28.58)	16 (20.00)	74(31.63)
3.	Buffalo	19 (38.00)	13 (23.64)	18 (36.74)	16 (20.00)	66 (28.20)
4.	Goat	2 (4.00)	-	-	30 (37.50)	32 (13.68)
5.	Mules	6 (12.00)	10 (18.18)	9 (18.36)	12 (15.00)	37 (15.81)
6.	Total livestock	<b>50 (100.00)</b>	<b>55 (100.00)</b>	<b>49 (100.00)</b>	<b>80(100.00)</b>	<b>234(100.00)</b>
7.	Poultry birds	24 (100.00)	16 (100.00)	30 (100.00)	-	70 (100.00)

Figures in parentheses indicate percentage to total

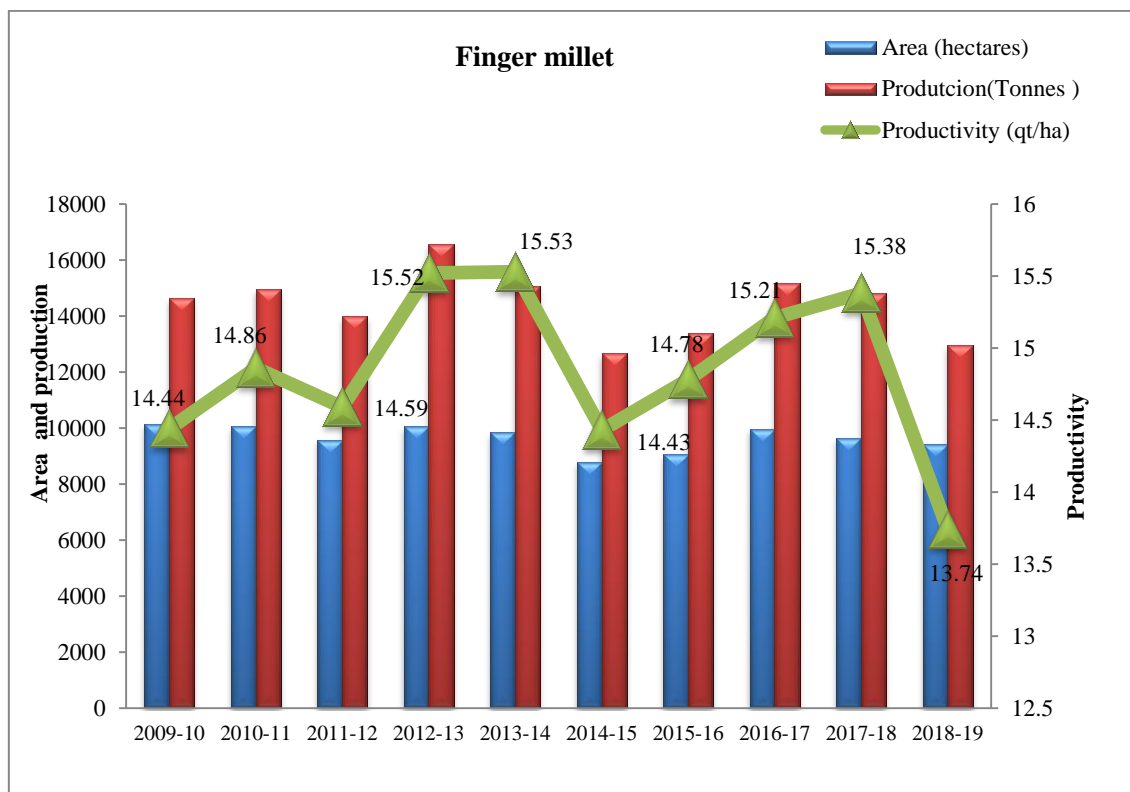
## 5.2 Compound annual growth rate of small millets

Growth rates in area, production and productivity of finger and barnyard millets in Chamoli district of Uttarakhand for the period 2009-10 to 2018-19 have been depicted in the table 5.6 and table 5.7, respectively.

**Table 5.6: Area, production and productivity of finger millet in Chamoli district of Uttarakhand**

Year	Area (hectare)	Production (quintals)	Productivity (quintal/ hectare)
2009-10	10142	146450	14.44
2010-11	10069	149640	14.86
2011-12	9583	139770	14.59
2012-13	10058	165790	15.52
2013-14	9828	150620	15.53
2014-15	8784	126753	14.43
2015-16	9057	133862	14.78
2016-17	9971	151670	15.21
2017-18	9641	148250	15.38
2018-19	9437	129680	13.74
<b>Compound annual growth rate (%)</b>	<b>-0.71</b>	<b>-0.94</b>	<b>-0.13</b>

Source: Krishi Sankhiyiki Patrika, Chamoli



**Figure 3: Trend in area, production and productivity of finger millet in Chamoli district**

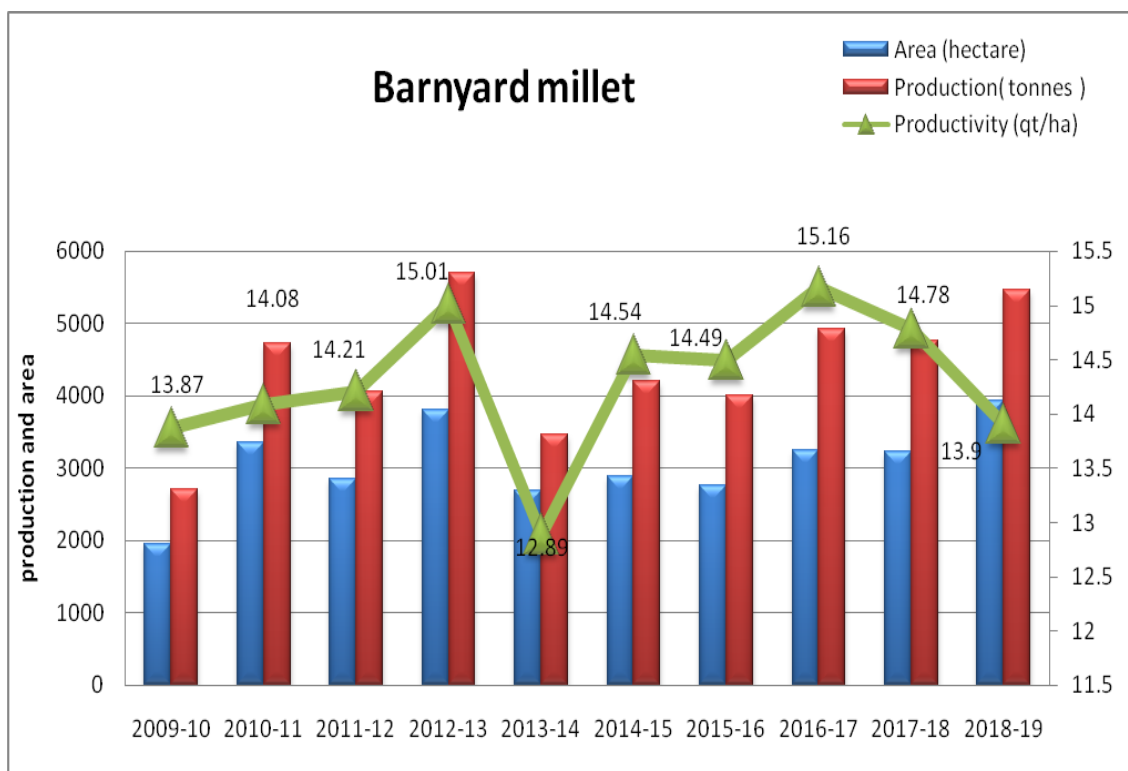
The table 5.6 indicates that during last ten years 2009-10 to 2018-19, the area under finger millet cultivation has decreased drastically from 10142 hectares in 2009-10 to 9437 hectares in 2018-19. The compound annual growth rate in area, production and productivity of finger millet were -0.71, -0.94 and -0.13 per cent, respectively. From the table it is evident that there were fluctuations in the area, production and productivity, showing the downward trend over the years (Fig 3.). A mild fluctuation was observed in the productivity over the years and it was contributed by both, area and production of millets. This negative growth may be attributed to the shift in the area under millet cultivation to other major cereal crops like rice and wheat. The probable reasons for decline in yield are lack of technological development- suitable high yielding varieties and improved production practices, lack of attractive farm prices etc. to farmers. Therefore, the cultivated area under millets declined continuously. Decrease in area has led to the lower production, and thus, profit too in the district. There was no functional regulated market established in the study area for procurement of produce from the farmers and it is a major setback for the millet growers. These were the major factors that constrained the production of finger millet in the study area.

**Table 5.7: Area, production and productivity of barnyard millet in Chamoli district of Uttarakhand**

<b>Year</b>	<b>Area (hectare)</b>	<b>Production (quintals)</b>	<b>Production (quintals/hectare)</b>
<b>2009-10</b>	2715	27150	13.87
<b>2010-11</b>	3361	47310	14.08
<b>2011-12</b>	2857	40610	14.21
<b>2012-13</b>	3796	56980	15.01
<b>2013-14</b>	2693	34700	12.89
<b>2014-15</b>	2891	42030	14.54
<b>2015-16</b>	2763	40050	14.50
<b>2016-17</b>	3245	49190	15.16
<b>2017-18</b>	3224	47660	14.78
<b>2018-19</b>	5457	54570	13.90
<b>Compound Annual growth rate (%)</b>	<b>3.54**</b>	<b>3.97*</b>	<b>0.42</b>

\*and \*\* indicate significant at 10 and 15 per cent probability levels

Table 5.7 represents the annual compound growth rate of barnyard millet for last ten years of Chamoli district. The table indicates that the area under barnyard millet cultivation has increased from 2715 hectare in 2009-10 to 5457 hectare in 2018-19 i.e., almost doubled. The annual compound growth rate in area, production and productivity of barnyard millet were found to be 3.54, 3.97 and 0.42 per cent, respectively. This growth may be attributed to fast increase in area under barnyard millet cultivation owing to decrease in area under finger millet cultivation and also the crop gained a fair price in the market area due to their increasing demand on the account of their nutritional value (Fig-4).



**Figure 4: Trend in area, production and productivity of barnyard millet in Chamoli district.**

### **5.3. Analysis of input use, cost of and returns from small millets production.**

The right use of inputs is necessary to maximize the level of output in any production enterprise. A study related to cost of input used will help bring out the extent of benefit derived from the farm's returns. The allocation of area under any crop by farmers besides other factors depends on the level of profitability per unit area. Hence, the study of costs and returns from millet crops exercise an important role in determining the relative profitability of small millet crop enterprises.

Millets are grown as one of the important kharif crops in the study area. In the view of this fact, it was thought pertinent to evaluate cost and returns from small millets production. A detailed analysis of cost and returns as found on the selected farms is presented in the tables given below.

#### **5.3.1 Input use in small millet cultivation.**

Table 5.8 reveals the input use on the per hectare basis for small millet production in the sample area. The table shows that man-days per hectare were required

for different operations like ploughing, weeding/thinning, application of manures, harvesting/threshing etc. However, the total labour required for barnyard millet was higher than finger millet i.e. 67.88 and 56.08 man-days per hectare, respectively. Further, the use of bullock power was found to be higher in barnyard millet which was 32.60 and 16.25 days per hectare in case of finger millet. They were mainly required for ploughing and sometimes for threshing purpose.

**Table 5.8: Input use level in small millet cultivation on sample farms (per ha)**

S. No.	Particulars	Finger millet	Barnyard millet
<b>A. Operational inputs</b>			
1.	<b>Human labour (man-days )</b>		
	<b>Ploughing</b>		
	Hired labour	3.02	6.10
	Owned labour	15.23	23.35
	<b>Weeding/thinning</b>		
	Hired labour	-	-
	Owned labour	14.62	12.87
	<b>Application of manures</b>		
	Hired labour	-	-
	Owned labour	12.09	10.89
	<b>Harvesting/ threshing</b>		
	Hired labour	-	-
	Owned labour	11.12	14.67
	<b>Total hired labour</b>	3.02	6.10
	<b>Total owned labour</b>	53.06	61.78
	<b>Total human labour</b>	56.08	67.88
2.	<b>Bullock pair (days)</b>		
	Hired	3.02	6.10
	Owned	13.23	26.50
	Total	16.25	32.60
<b>B. Materials</b>			
3.	Seed quantity (Kg)	21.20	26.21
4.	FYM (Quintals)	138.42	116.28
5.	Fertilizer	-	-
6.	Urea	-	-
7.	DAP	-	-
8.	Irrigation (No.)	-	-

It is evident from the table that the average seeds required for sowing for barnyard millet were higher than finger millet while which it was 21.20 and 26.21 kg per hectare, respectively, the requirement of FYM was higher in finger millet i.e., 138.42 qt. per ha and in case of barnyard millet, it was 116.28 qt per ha. FYM was the

only source of nutrients in the sampled area. There were no use chemical fertilizers, since traditional/organic farming was practiced by the sample farmers. The small millet being a rainfed hill crop does not require much irrigations and application of organic manure also retained moisture content in the soil.

### **5.3.2 Costs of cultivation of small millet.**

#### **a. Operational cost**

The component-wise various costs incurred in the production of small millet has been given in the table 5.9. Operational costs include the cost of human labour and cost of bullock labour. The total cost of imputed value of family labour incurred for finger millet and barnyard millet was Rs.15918 (31.90% of cost  $C_3$ ) and Rs.18534 (29.96% of cost  $C_3$ ), respectively. The other component of operational cost was bullock power. The total cost incurred on bullock was higher in barnyard millet cultivation i.e., Rs.16300 per ha because it require more tillage practices for crumbliness soil. In finger millet cultivation, the cost associated with bullock power was Rs.16824 per ha which was required for single ploughing.

#### **b. Material cost**

The items of material cost comprise of seeds, farm yard manure (FYM), fertilizers, plant protection measures. The total expenditure made on input material for finger millet and barnyard millet was Rs.7239 per hectare (14.50% of  $C_3$ ) and Rs. 6286 (10.16% of  $C_3$ ), respectively. The per hectare cost of FYM was higher than the cost of seeds required for sowing for both crops. The cost incurred on FYM for finger millet and barnyard millet was Rs.6921 and Rs.5814 per hectare, respectively. For the same sequence of crops the cost of seed requirement was found to be Rs.318 and Rs.472 per hectare for the surveyed farms. Since, organic farming in the form of FYM application was in the practiced therefore, there was no use of chemical fertilizers and other plant protection measures, thus no cost was involved for them in small millet cultivation. The crop was entirely rainfed, so there was no requirement of irrigation by the sample farmers in the area.

#### **c. Other costs**

In the total cost of cultivation of any crop enterprise, besides operational and material cost, other costs such as rental value of owned land, interest on the value of

**Table 5.9: Costs and returns in small millet cultivation of sample farmers (Rs/ha)**

S.No.	Particulars	Finger millet		Barnyard millet	
		Cost (Rs)	Share %	Cost (Rs)	Share %
<b>A. Operational cost</b>					
<b>Ploughing</b>					
1.	<b>Human labour</b>				
	Hired labour	906.00	1.81	1830.00	2.95
	Owned labour	4569.00	9.15	7005.00	11.32
<b>Weeding/ thinning</b>					
	Hired labour	-	-	-	-
	Owned labour	4386.00	8.79	3861.00	6.24
<b>Application of manures</b>					
	Hired labour	-	-	-	-
	Owned labour	3627.00	7.26	3267.00	5.28
<b>Harvesting / threshing</b>					
	Hired labour	-	-	-	-
	Owned labour	3336.00	6.68	4401.00	7.11
	<b>Total hired labour cost</b>	906.00	11.81	1830.00	2.95
	<b>Total owned labour cost</b>	15918.00	31.90	18534.00	29.96
	<b>Total human labour cost</b>	<b>16824.00</b>	33.71	<b>20364.00</b>	32.91
2.	Bullock labour				
a)	Hired	1510.00	3.02	3050.00	4.93
b)	Owned	6615.00	13.25	13250.00	21.41
	<b>Sub-total (a+b)</b>	<b>8125.00</b>	16.28	<b>16300.00</b>	26.34
	<b>Total (1+2)</b>	<b>24949.00</b>	50.00	<b>36664.00</b>	59.26
<b>B. Material cost</b>					
3.	Seed	318.00	0.63	472.00	0.76
4.	Manure	6921.00	13.87	5814.00	9.39
5.	Fertilizer	-	-	-	-
5.	Plant protection	-	-	-	-
6.	Irrigation	-	-	-	-
	Sub-total (3+4)	7239.00	14.50	6286.00	10.16
<b>C. Other costs</b>					
7.	Rental value of owned land	12000.00	24.05	12000.00	19.39
8.	Depreciation on fixed assets	360.00	0.62	425.84	0.68
9.	Interest on fixed assets	310.90	0.69	390.24	0.63
10.	Interest on working capital @7 %	499.31	1.00	471.45	0.76
	Sub-total (7+8+9+10)	13170.21	26.39	13287.53	21.47
	<b>Grand total (A+B+C)</b>	<b>45358.21</b>	<b>90.90</b>	<b>56237.53</b>	<b>90.90</b>
<b>D.</b>	<b>Total cost of cultivation at</b>				
	Cost A <sub>1</sub>	17129.31	34.33	25313.29	40.91
	Cost A <sub>2</sub>	17129.31	34.33	25313.29	40.91
	Cost B <sub>1</sub>	17440.21	34.95	25703.53	41.55
	Cost B <sub>2</sub>	29440.21	59.00	37703.53	60.94
	Cost C <sub>1</sub>	33358.21	66.85	44237.53	71.51
	Cost C <sub>2</sub>	45358.21	90.90	56237.53	90.90
	Cost C <sub>2</sub> *	45358.21	90.90	56237.53	90.90
	Cost C <sub>3</sub>	49894.03	100.00	61861.28	100.00

fixed capital assets, depreciation and interest on working capital constitute an important component. The other cost incurred on finger millet and barnyard millet cultivation was Rs.13170.21 (26.39% of  $C_3$ ) and Rs.13287.53 per hectare (21.47 % of  $C_3$ ), respectively. The highest share was contributed by the rental value of land (Rs.12000 per ha) which accounted for 24.05 and 19.39 per cent of  $C_3$  for both the farms.

### 5.3.3 Comparisons of costs based on CACP concepts

Table 5.9 presents various other items of cost, as per cost concepts given by CACP. These cost concepts are widely used because of their prevalence in decision making process. These include cost  $A_1$ , cost  $A_2$ , cost  $B_1$ , cost  $B_2$ , cost  $C_1$ , cost  $C_2$ , cost  $C_2^*$ , and cost  $C_3$ .

Cost  $A_1$  was worked out to be Rs.17129.31 and Rs.25313.29 per hectare for finger millet and barnyard millet cultivation, respectively. The practice of 'leasing in' and 'leasing out' of land was not prevalent in the study area, hence cost  $A_1$  and  $A_2$  were same for the given sample farms. The value of cost  $B_1$  and cost  $B_2$  for finger millet was worked out to be Rs.17440.21 and Rs.29440.21 per hectare, respectively while for barnyard millet it was Rs.25703.53 and Rs.37703.53.

Cost  $C_1$  which includes both cost  $B_1$  and imputed value of family labour was found to be Rs.33358.21 and Rs.44237.53 per ha for finger millet and barnyard millet, respectively. In the same way cost  $C_2$  constituted Rs.45358.21 and Rs.56237.53 per hectare for both the farms. It was found that cost  $C_2$ , cost  $C_2^*$  were almost same for both the crops because the same was calculated at actual wage rate which was higher than statutory minimum wage rate for unskilled labour. The per hectare cost  $C_3$  was the total cost of cultivation which included the managerial cost of farms. It turned out to be Rs.49894.03 per hectare for finger millet and Rs. 61861.28 per hectare for barnyard millet.

### 5.3.4 Yield and returns from small millets cultivation

Table 5.10 revealed that the yield of finger millet was 19.31 qt per hectare which is slightly higher than the barnyard millet i.e., 17.42 qt per hectare. The selling price of main product was Rs.1500 per qt for finger millet and in case of barnyard millet, it was Rs.1800.00. Similarly the selling prices of by-product in both the millet crops were valued at different market rate as Rs.700 and Rs.800 per qt. for finger millet and barnyard millet, respectively. The table further revealed that the yield of by-product was more than the yield

from main product, indicating that production of small millet was a subsistence crop and primarily grown for grain as well as fodder purposes in the study area.

The net returns over cost  $C_3$  on both farms were found to be positive i.e., Rs.8820.97 and Rs.12374.72 per hectare for finger millet and barnyard millet, respectively. On the basis of above findings it can be concluded that barnyard millet was more profitable than finger millet with respect to gross returns and net returns. The return per rupee of expenditure was also found to be 1.17 for finger millet and in case of barnyard millet, 1.20 indicating that for every one rupee invested, there was a net profit of Rs. 0.17 and Rs. 0.20 in finger millet and barnyard millet cultivation, respectively.

**Table 5.10: Yield and returns on different costs of small millets cultivation**

(Rs./ha)

S. No.	Particulars	Finger millet	Barnyard millet
1.	Cost of production (Rs/qt)	807.21	871.04
2.	Yield of main product (qt/ha)	19.31	17.42
3.	Yield of by-product (qt/ha)	42.50	53.60
4.	Selling price of main product (Rs/qt)	1500.00	1800.00
5.	Selling price of by-product product (Rs/qt)	700.00	800.00
6.	Returns from main product (Rs.)	28965.00	31356.00
7.	Returns from by-product (Rs.)	29750.00	42880.00
8.	<b>Gross return</b>	58715.00	74236.00
10.	<b>Net return (Rs.) over</b>		
	Cost A <sub>1</sub>	41585.69	48922.71
	Cost A <sub>2</sub>	41585.69	48922.71
	Cost B <sub>1</sub>	41274.79	48532.47
	Cost B <sub>2</sub>	29274.79	36532.47
	Cost C <sub>1</sub>	25356.79	29998.47
	Cost C <sub>2</sub>	13356.79	17998.47
	Cost C <sub>2</sub> *	13356.79	17998.47
	Cost C <sub>3</sub>	8820.97	12374.72
11.	Net return (Rs/ha)	8820.97	12374.72
12.	Returns per rupee of expenditure	1.17	1.20

## 5.4 Marketing pattern of small millets in study area

The present section deals with presentation and discussion of result related to utilization and marketing pattern of small millets. The marketing pattern includes marketed surplus, marketing channels for the selected millet crops, marketing cost, margins, price spread and marketing efficiency of different marketing channels in the marketing of selected small millets.

### 5.4.1 Utilization pattern of small millets.

The utilization pattern of small millets by the sample farmers is presented in the table 5.11. It is evident from the table that total production of selected millet crop, finger millet and barnyard millet was 19.31 and 17.42 qt. per farm, respectively. The data given in the table shows that a small quantity of millets was utilized at the farm level that included as seed and household consumption and it accounted for 20 and 30 per cent for finger millet and barnyard millet, respectively, while the remaining amount was marketed by the producers in different channels.

**Table 5.11: Quantity available for sale/marketed surplus** (qt/farm)

S. No.	Particulars	Finger millet	Barnyard millet
1.	Utilization at household-level	3.86 (20.00)	5.23 (30.00)
2.	Marketable surplus	15.45 (80.00)	12.19 (70.00)
3.	Production	19.31 (100.00)	17.42 (100.00)

Figures in parentheses shows per cent to the total quantity produced

### 5.4.2 Marketing of small millets by producers

The small millets are non-perishable commodity that can be sold throughout the year. Farmers were found selling-out the millets mainly through two channels in the study area, the first channel was Producer-Village trader-Retailer-Consumer and the second Producer- Wholesaler-Retailer-Consumer. Out of thesetwo channels, maximum quantity of produce was traded through the second channel for both, finger and barnyard millet in the study area.

### 5.4.3 Disposal pattern of small millets by producers.

Disposal pattern over the marketing channel is presented in table 5.12. Before disposing off millets by the producers, a small proportion of produce is kept to use in seed for growing/planting in the next season and also for self-consumption. The result showed that major proportion of the produce was disposed through wholesaler, whereas the remaining was sold through village traders in the study area.

**Table 5.12: Disposal pattern of small millets by sample farmers (qt/farm)**

S. No.	Millets	Particulars	Quantity sold (qt)	Price (Rs/qt)
1.	Finger millet	Village trader	4.65 (30.09)	1500.00
		Wholesaler	10.80 (69.91)	1800.00
		<b>Total</b>	<b>15.45 (100.00)</b>	
2.	Barnyard millet	Village trader	4.07 (33.38)	1800.00
		Wholesaler	8.12 (66.62)	2200.00
		<b>Total</b>	<b>12.19 (100.00)</b>	

Figures in parentheses shows per cent to the total quantity produced

### 5.4.4 Marketing channels

The study revealed that two major marketing channels were identified in the study area through which the millets were marketed. These are given under:

Channel I: Producer- Village trader- Retailer- Consumer.

Channel II: Producer- Wholesaler- Retailer- Consumer

### 5.4.4 Marketing cost, marketing margin, price spread and producer's share in consumer's rupee

This section covers the different aspects of marketing of small millets i.e., marketing cost, marketing margins, price spread and producer's share in consumer's rupee.

#### 5.4.5.1 Marketing cost incurred in the marketing of small millets.

The commodities are moved from producers to consumers through market functionaries. There is a particular cost associated with every function or service at various stages of marketing. These costs are incurred by different intermediaries and are referred as marketing cost. The intermediaries make some profit to remain in the trade after meeting the cost of the function performed by them. Under this sub-section function-wise and agency-wise marketing cost is discussed.

#### 5.4.5.2 Marketing cost incurred in small millets marketing through channel- I

Table 5.13 presents the marketing cost incurred by different agencies in different functions of marketing through channel- I (Producer- Village trader- Retailer - Consumer). The table reveals that the total cost incurred in marketing of finger millet and barnyard millet was Rs. 158.20 and Rs. 177.78 per qt, respectively. It is evident from the table that transportation charge constitutes the major part of the total marketing cost for finger millet and barnyard millet i.e., 35.39 and 36.43 per cent, respectively, which was paid by the village trader. The share of packaging material constituted the second highest part of the total marketing cost in case of both finger and barnyard millet that are 15.17 and 13.49 per cent, respectively. The other major components of the total marketing cost were labour charges, cost of storage, packaging/labeling that together accounted for more than 50 per cent of total marketing cost. Further, the analysis revealed that a large part of the marketing cost was incurred by the village trader followed by retailer and then by producer.

**Table 5.13: Marketing cost incurred in channel I** (Rs/qt)

S. No.	Functions	Crops	
		Finger millet	Barnyard millet
<b>A.</b>	<b>Marketing cost incurred by producer</b>		
1.	Packaging material	24.00 (15.17)	24.00 (13.50)
2.	Loading /unloading	4.50 (2.84)	3.50 (1.97)
3.	Miscellaneous	2.00 (1.26)	5.00 (2.81)
	<b>Sub –total</b>	30.50 (19.27)	32.50 (18.28)
<b>B.</b>	<b>Marketing cost incurred by the village trader</b>		
1.	Labour charges	12.00 (7.59)	12.00 (6.75)
2.	Transportation cost	56.00 (35.39)	64.78 (36.44)
	<b>Sub-total</b>	68.00 (42.98)	76.78 (43.19)
<b>C.</b>	<b>Marketing cost incurred by retailer</b>		
1	Labour charges	12.00 (7.58)	12.00 (6.75)
2.	Transportation charges	28.00 (17.70)	32.50 (18.28)
3.	Loading /unloading	3.50 (2.22)	4.00 (2.25)
4.	Storage	16.20 (10.25)	20.00 (11.25)
	<b>Sub-total</b>	59.70 (37.75)	68.50 (38.53)
	<b>Total marketing cost</b>	<b>158.20 (100.00)</b>	<b>177.78 (100.00)</b>

Figures in parentheses shows the per cent to the total marketing cost

### 5.4.5.3 Price spread of small millets marketing

#### Price spread in channel-I: Producer- Village trader- Retailer- Consumer

##### a. Finger millet

The estimated price spread for finger and barnyard millet in channel- I (Producer-Village trader-Retailer-Consumer) is presented in table 5.14. The total marketing cost of finger millet was Rs.158.20 per qt that is 6.33 per cent to consumer's rupee. It is evident from the table that the marketing cost incurred by the producer, village trader and retailer were Rs.30.50, Rs.68.00 and Rs.59.70 per qt, respectively, which accounted for 1.22, 2.72 and 2.74 per cent to consumer's rupee, respectively. The absolute margin of Rs.640.30 per qt was realized by the retailer. Whereas per cent margin and mark up margin were estimated to be 25.61 and 35.57 per cent, respectively. The price spread for finger millet was estimated to be 41.22 per cent indicating that for each rupee paid by the consumer, producer realized only 58.78 per cent.

**Table 5.14: Price spread for small millet in channel I** (Rs/qt)

S. No.	Particulars	Finger millet		Barnyard millet	
		Value	Percentage to consumer's rupee	Value	Percentage to consumer's rupee
1.	Total marketing cost	158.20	6.33	177.78	5.92
2.	Marketing cost incurred by producer	30.50	1.22	32.50	1.08
3.	Price received by the producer	1500.00	60.00	1800.00	60.00
4.	Net price realized by the producer	1469.50	58.78	1767.50	58.91
5.	Village trader's purchase price	1500.00	60.00	1800.00	60.00
6.	Marketing cost incurred by village trader	68.00	2.72	76.78	2.55
7.	Net price borne by the village trader	1568.00	62.72	1876.78	62.55
8.	Village trader's sale price	1800.00	72.00	2200.00	73.34
9.	Village trader's margin	232.00	9.28	323.22	10.77
10.	Retailer's purchase price	1800.00	72.00	2200.00	73.34
11.	Marketing cost incurred by Retailer	59.70	2.38	68.50	2.28
12.	Net price borne by the Retailer	1859.70	74.38	2268.50	75.61
13.	Retailer's sale price	2500.00		3000.00	
14.	Retailer's margin				
a)	Absolute margin	640.30		731.50	
b)	Per cent margin (%)	25.61		24.38	
c)	Mark up margin (%)	35.57		33.25	
15.	Consumer's purchase price	2500.00		3000.00	
16.	Price spread (%)	41.22		41.08	
17.	Producer's share in consumer's rupee (%)	58.78		58.92	

### b. Barnyard millet

Table 5.14 shows the price spread in barnyard millet marketing in channel I (Producer-Village trader-Retailer-Consumer). The total marketing cost incurred in barnyard millet marketing was Rs.177.78 per qt. i.e., 5.92 per cent to consumer's rupee. The marketing cost incurred by producer, village trader and retailer were Rs.32.50, 76.78 and Rs.68.50 per qt, respectively, which estimated to be 1.08, 2.55 and 2.28 per cent to consumer's rupee, respectively. The absolute margin realized by the village trader was Rs.323 per qt. Further, in case of retailer, absolute margin was Rs.731.50 per qt while per cent margin and mark up margin were found out to be 24.38 and 33.25 per cent, respectively. The price spread for barnyard millet turned out to be 58.92 per cent and producer's share in consumer's rupee was 41.08 per cent.

#### 5.4.5.4 Marketing cost incurred in channel- II

Table 5.15 shows the marketing cost incurred in channel-II (Producer-Wholesaler- Retailer-Consumer). Marketing channels and price spread of small millets in the study area was illustrated in this section. The marketing cost incurred in marketing of finger millet and barnyard millet in channel II was estimated to be Rs.136.30 and Rs.137.05 per qt, respectively.

**Table 5.15: Marketing cost incurred in channel II** (Rs/qt)

S. No.	Function	Crops	
		Finger millet	Barnyard millet
<b>A.</b>	<b>Marketing cost incurred by farmers</b>		
1.	Packaging material	16.00 (11.73)	16.00 (11.67)
2.	Transportation	55.80 (40.93)	55.80 (40.71)
3.	Miscellaneous	2.50 (1.83)	2.50 (1.82)
	<b>Sub-total</b>	<b>74.30 (54.51)</b>	<b>74.30 (54.21)</b>
<b>B.</b>	<b>Marketing cost incurred by wholesaler</b>		
1.	Labor charges	7.50 (5.50)	7.50 (5.47)
2.	Storage	12.50 (9.17)	12.50 (9.12)
3.	Miscellaneous	3.50 (2.56)	2.75 (2.00)
	<b>Sub-total</b>	<b>23.50 (17.24)</b>	<b>22.75 (16.59)</b>
<b>C.</b>	<b>Marketing cost incurred by retailer</b>		
1.	Transportation	24.50 (17.97)	27.75 (20.24)
2.	Loading unloading	4.50 (3.30)	3.75 (2.73)
3.	Packaging	6.00 (4.40)	6.00 (4.37)
4.	Miscellaneous	3.50 (2.56)	2.50 (1.82)
	<b>Sub-total</b>	<b>38.50 (28.24)</b>	<b>40.00 (29.18)</b>
	<b>Total</b>	<b>136.30 (100.00)</b>	<b>137.05 (100.00)</b>

Figures in parentheses shows the per cent to the total marketing cost

The marketing cost incurred by producer in marketing of finger millet and barnyard millet was more than 50 per cent showing that transportation cost occupied the major share of the total marketing cost incurred by the producer. Further, the major component of marketing cost of the retailer was cost incurred on transportation followed by packaging/labeling cost in case of both, finger millet and barnyard millet. The marketing analysis showed that a substantial part of the total marketing cost was incurred by the producer followed by retailer and then wholesaler in case of both crops.

#### 5.4.5.5 Price spread in channel II (Producer-Wholesaler-Retailer-Consumer)

##### a. Finger millet

The estimated price spread for finger millet in channel II (Producer-Wholesaler-Retailer-Consumer) is presented in table 5.16. The total marketing cost of finger millet was estimated to be Rs.136.30 per qt, which was 4.95 per cent to the consumer's rupee.

**Table 5.16: Price spread for small millets in channel II** (Rs/qt)

S. No.	Particulars	Finger millet		Barnyard millet	
		Value	Percentage to consumer's Rupee	Value	Percentage to consumer's Rupee
1.	Total marketing cost	136.30	4.95	137.05	4.28
2.	Marketing cost incurred by producer	74.30	2.70	74.30	2.32
3.	Price received by producer	1800.00	65.45	2200.00	68.75
4.	Net price realized by producer	1725.70	62.75	2125.70	66.42
5.	Wholesaler's purchase price	1800.00	65.45	2200.00	68.75
6.	Marketing cost incurred by wholesaler	23.50	0.85	22.75	0.71
7.	Net price borne by Wholesaler	1823.50	66.30	2222.75	69.94
8.	Wholesaler's sale price	2050.00	74.54	2570.00	80.31
9.	Wholesaler's margin	226.50	8.21	347.20	10.85
10.	Retailer's purchase price	2050.00	74.54	2570.00	80.31
11.	Marketing cost incurred by retailer	38.50	1.40	40.00	1.25
12.	Net price borne by retailer	2088.50	75.94	2610.00	81.56
13.	Retailer's sale price	2750.00		3200.00	
14.	Retailer's margin				
a)	Absolute margin	661.50		590.00	
b)	Per cent margin (per cent)	24.04		18.43	
c)	Mark up margin (per cent)	32.26		21.45	
15.	Consumer's purchase price	2750.00		3200.00	
16.	Price spread	37.25		33.57	
17.	Producer's share in consumer's rupee (per cent)	62.75		66.43	

The marketing cost incurred by the producer was 2.70 per cent to consumer's rupee, while the cost incurred by wholesaler and retailer was found to be Rs.23.50 and Rs.38.50 per qt, respectively, which accounted for 0.85 and 1.40 per cent to consumer's rupee, respectively. The absolute margin realized by the retailer was estimated to be Rs.661.50 per qt, while the per cent margin and mark up margin turned out to be 24.04 and 32.26 per cent, respectively. The price spread in marketing of finger millet was found to be 37.25 per cent and producer's share in consumer's rupee was 62.75 per cent.

#### **b. Barnyard millet**

The table 5.16 shows the price spread in barnyard millet marketing. It is evident from the table that total marketing cost of barnyard millet in channel II (Producer-Wholesaler- Retailer-Consumer) was estimated to be Rs.137.05 per qt, which was 4.28 per cent to the consumer's rupee. The magnitude of marketing cost incurred by producer, wholesaler and retailer was found out to be Rs.74.30, Rs.22.75 and Rs.40 per qt, respectively accounting for 2.32, 0.71 and 1.25 per cent to consumer's rupee, respectively. The absolute margin of wholesaler was Rs.347.20 per qt i.e., 10.85 per cent to consumer's rupee, while the same was Rs.590 per qt. for retailer. Whereas, per cent margin and mark up margin of retailer was 18.43 and 21.45 per cent, respectively. The price spread for barnyard millet turned out to be 33.57 and producer's share was 66.43 per cent in consumer's rupee.

#### **5.4.6 Marketing efficiency of different marketing channels of small millets**

The estimation of marketing efficiency of different marketing channels is dependent on the level of marketing cost, marketing margins realized by different intermediaries, price paid by the consumer and price received by the producer. A high level of marketing cost, marketing margins, price paid by the consumers as well as low price received by the producer for a given level of produce under a particular marketing channel is a reflection of poor marketing efficiency.

An analysis of the table 5.17 shows the marketing efficiency of the given marketing channels in moving the produce from producer to consumer in the study area. The study revealed that channel II was the most efficient channel in the study area with an efficiency index of 1.68 and 1.97 for finger millet and barnyard millet, respectively while channel I was less efficient as compared to channel II with an efficiency index of 1.42 and 1.43 for finger

millet and barnyard millet, respectively. It can be concluded that high marketing costs as well as marketing margins by the intermediaries involved in the channels led to a higher price spread thus, resulting in poor marketing efficiency. The share of producer in consumer's rupee was found to be higher in channel II.

**Table 5.17: Marketing efficiency of different marketing channels**

S. No.	Particulars	Channel I		Channel II	
		Finger millet	Barnyard millet	Finger millet	Barnyard millet
1.	Net price received the by producer (Rs/qt)	1469.00	1767.50	1725.70	2125.70
2.	Marketing cost incurred by producer (Rs/qt)	30.50	32.50	74.30	74.30
3.	Marketing cost of village trader (Rs/qt)	68.00	76.78	-	-
4.	Marketing margins of village trader (Rs/qt)	232.00	323.22	-	-
5.	Marketing cost of wholesaler (Rs/qt)	-	-	23.50	22.75
6.	Marketing margin of wholesaler (Rs/qt)	-	-	226.50	347.20
7.	Marketing cost of retailer (Rs/qt)	59.70	68.50	38.50	40.00
8.	Marketing margin of retailer (Rs/qt)	640.30	731.50	661.50	590.00
9.	Total marketing cost (Rs/qt)	158.20	177.78	136.30	137.05
10.	Total marketing margins (Rs/qt)	872.30	1054.72	888.00	937.20
11.	Consumer's price (Rs/qt)	2500.00	3000.00	2750.00	3200.00
12.	<b>Marketing efficiency index {1/ (9+10)}</b>	<b>1.42</b>	<b>1.43</b>	<b>1.68</b>	<b>1.97</b>

## 5.5 Constraints in the production and marketing of small millets

The constraints faced by the farmers in production and marketing of small millet have been discussed under this section. The analysis was done by putting the constraints before the sample farmers and they were asked to rank the constraints according to their severity. The rank given by the farmers were converted into the average per cent position and then into scores. Finally, the scores were converted into the ranks with the help of Garrett ranking table. Ranks for the various constraints based on the Garrett score is presented in the table 5.18.

### 5.5.1 Production constraints

The given table reveals that the fragmented land was the most severe production constraint in case of both, finger millet and barnyard millet, with Garrett score of 78.13 and 80.00, respectively. Similarly, the second severe most constraint was found to be attack of wild animals having a Garrett score of 65.01 and 64.08 for finger millet and barnyard millet, respectively. In case of finger millet, migration and unfavorable climatic conditions were ranked third (61.90) and fourth (57.54) most severe constraints faced by the farmers while in case of barnyard millet, lack of technical knowledge and unfavorable climatic conditions were ranked third and fourth with average mean score of 63.10 and 60.75, respectively (Table 5.18).

**Table 5.18: Constraints faced by sample farmers in production and marketing of small millets**

S. No.	Constraints	Small millets	
		Finger millet	Barnyard millet
(A)	<b>Production constraints</b>		
1.	Migration	3 (61.90)	6 (54.20)
2.	Attack of wild animals	2 (65.01)	2 (64.08)
3.	Unfavorable climatic conditions	4 (57.54)	4 (60.75)
4.	Lack of technical knowledge	10 (27.30)	3 (63.10)
5.	Unavailability of adequate inputs	8 (39.65)	7 (36.98)
6.	Lack of trained labour	9 (30.78)	8 (32.15)
7.	Fragmented lands	1 (78.13)	1 (80.00)
8.	Storage	7 (50.85)	5 (54.80)
9.	Risk aversion	5 (44.10)	9 (27.88)
10.	Attack of pest/ diseases	6 (42.73)	10 (27.16)
(B)	<b>Marketing constraints</b>		
1.	Less remunerative prices	1 (68.50)	1 (65.66)
2.	Lack of organized market place	3 (46.91)	5 (32.83)
3.	Lack of information	5 (29.75)	4 (33.00)
4.	High transportation cost	2 (62.00)	2 (64.25)
5.	Lack of processing facility	4 (42.33)	3 (53.50)

Figures in parentheses shows mean score value

### 5.5.2 Marketing constraints

The table 5.18 reveals that less remunerative prices was the most severe constraint for the finger as well as barnyard millet indicates through the analysis of Garrett score of 68.50 and 65.66, respectively, while high transportation cost was the second most severe constraint in the marketing of small millets.



*Summary  
and  
Conclusion*



Millets are one of the most important coarse cereals grown in India and popularly known as nutri-cereals. Nutri-cereals include barley, sorghum (jowar), pearl millet (bajra), maize and other small millets namely finger millet (ragi), barnyard millet (jhangora), foxtail millet (kangni), little millet (kutki), kodo millet (kodra) and proso millet (barri) and two pseudo millets buckwheat (kuttu) & amaranthus (chaulai). Among all the small millets, finger and barnyard millet have maximum production in the country.

The area under nutri-cereals has declined from 28.48 million ha in 2007-08 to 23.98 million ha in 2017-18. However, the productivity has increased significantly from 1431 kg per ha in 2007-08 to 1871 kg per ha in 2017-18. The increase in productivity was observed in almost all major nutri-cereals growing states, ultimately resulting in an increase in the total production from 40.75 million tonnes in 2007-08 to the estimated record production of 44.87 million tonnes in 2017-18. This shows the success of crop development strategy in India. The major nutri-cereals producing states in the country are Rajasthan, Maharashtra, Karnataka, Uttar Pradesh, Gujarat, Haryana, Madhya Pradesh, Tamil nadu, Andhra Pradesh and Uttarakhand.

These millets emerge as one of the most promising food crops and can be considered as ideal crop of 21st century where we face depleting natural resources in an era of climate change. Millets have been a part of the local food system and culture in countries like India and Africa with major contribution towards sustainable agriculture, providing economic security to the farmers through sustainable source of income. Earlier millets were considered as poor man's food due to their unpalatable taste and appearance despite having highly nutritional values. But now these millets have occupied a special place in the existing food system on the account of processed and value added products available in the market place. Owing to their growing demand in the market there is need to bridge the gap between the production and supply side by strengthening the marketing channels and integration of different markets.

In the hills of Uttarakhand, finger millet and barnyard millet are the most important Kharif crops. The cultivation of these crops provides a wider scope for farmers to increase

their income in the face of adverse climatic conditions resulting in reduction of the yield. They are highly adapted to the dry lands with rainfed conditions, requiring meager inputs for their cultivation. Although over the years, the production has been rising in the state but still there is a need to explore the possibilities of utilizing its full potential. Therefore, strategic efforts should be made to enhance the area under production and ultimately the productivity. To make the millet farming a profitable venture, it is required to make satisfactory profit margin but it seemed to be the most challenging aspect as the profitability of any crop depends upon various factors such as the type of marketing channel, extent of marketing functions performed, marketing margins associated with intermediaries involved, marketing cost involved in moving the produce from producer to the ultimate consumer. The high marketing cost and margins at various stages hinder the marketing process which leads to the higher price spread and provide distinctiveness to the growers.

In the view of above mentioned facts, the present study was undertaken to accomplish the following objectives -

**Objectives of the study:**

1. To estimate the trend in area, production and productivity of small millets in the Chamoli district.
2. To compute the cost of and returns from small millets cultivation in the study area.
3. To analyze the marketing efficiency of small millets.
4. To identify the constraints in the production and marketing of small millets.

**Methodology:**

The present study was conducted in the Chamoli district of Uttarakhand state. The district was selected purposively as small millets are extensively grown in the area and Chamoli district ranks third (finger millet) and fifth (barnyard millet) in the state in terms of area, production and productivity. The district is comprised of nine blocks, out of which two blocks were selected as it was convenient to procure authentic data required for the study. From each block, two villages were selected randomly, each from mid hills and high hills. A list of all small millets growing farmers was prepared from the four selected villages and fifteen farmers from each village were selected randomly. Thus, a total sample size of sixty farmers was taken. Primary data on the production and marketing

aspects pertaining to the year 2020-21 were collected from the respondents through personal interview method using well structured pre-tested survey schedule. Similarly, secondary data were collected from the various publications of the Block Development Offices (BDO), District Statistical Office, District Agriculture Office, Directorate of Agriculture, research papers, Journals, publications, books such as Sankhiyiki Patrika, Chamoli district, etc.

To attain the first objective, Compound annual growth rate (CAGR) was used to find trend in area, production and productivity of small millets in the study area. To attain the second objective i.e., costs in and returns from small millets production was estimated using the cost concepts given by Commission on Agriculture Cost and Prices (CACP). To attain the third objective, simple descriptive analysis was done to identify the marketing channels of small millets. Marketing cost, marketing margin, price spread and producer's share in consumer's rupee in the disposal of small millets were calculated across the observed marketing channels in the study area. For the fourth objective, problems related to production and marketing of small millets were identified and then calculated using Garrett's ranking technique.

#### **Major findings of the study:**

- The average operational holding on overall farms was found to be 0.43 hectare. It can be seen that most farmers were under marginal category having less than one hectare of land. The study revealed that these small millets were the major kharif crops grown in the study area for feed as well as fodder purpose. The average coverage of area under barnyard millet was more than finger millet with an average land holding of 0.13 ha and 0.10 hectare, respectively.
- The per hectare cost of cultivation for finger millet and barnyard millet was computed to be Rs.49894.03 and Rs.61861.28, respectively with the maximum share of imputed value of family labour i.e., 31.90 per cent for finger millet and 29.96 per cent for barnyard millet cultivation.
- Cost  $A_1$  and cost  $A_2$  were found to be equal as there was no case of lease-in land in the study area.
- Material cost accounted for 14.50 and 10.16 per cent of total cost  $C_3$  for finger millet and barnyard millet, respectively. There was no use of fertilizers or

chemicals on the account of practicing organic farming in the study area. The crops were entirely rainfed so no irrigation was given to the crops.

- The other costs also played an important role which includes rental value of land. On per hectare basis the proportion of rental value of land was Rs.12000 per hectare (each) for both, finger millet and barnyard millet i.e. 24.05 and 19.39 per cent of their respective total cost  $C_3$ .
- The yield of by-product was higher than the yield of main product for both small millets. In case of barnyard millet the yield of by-product was almost thrice the yield of main product i.e. 53.60 and 17.42 qt per ha, respectively and similarly, for finger millet it was 42.50 and 19.31 qt. per ha, respectively.
- The gross returns obtained in case of finger millet and barnyard millet were estimated to be Rs.58715 and Rs.74236 per hectare, respectively. It shows that the gross return from barnyard millet cultivation was higher and fetched more prices than finger millet cultivation in the area.
- The net return over cost  $C_3$  was also slightly higher in case of barnyard millet (Rs.12374.72) than finger millet (Rs.8820.97) with a benefit-cost ratio of 1.20 and 1.17, respectively. So, it can be concluded that finger millet and barnyard millet cultivation was a profitable venture in the area.
- The survey reveals that two marketing channels have been operating in the study area for the sale of small millets. Channel I- Producer-Village trader- Retailer- Consumer and channel II- Producer- Wholesaler- Retailer- Consumer. The major share of produce was marketed through channel II i.e., 69.91 per cent for finger millet whereas 66.62 per cent for barnyard millet.
- There were marketing channels in the area with a negligible intervention of the Government to curb the malpractices done by the intermediaries. However, the marketing channel II was found to be more efficient than channel I for both small millets.
- Out of all the constraints faced in the production of small millets, fragmented land holdings, attack of wild animals, lack of technical knowledge, unfavorable climatic conditions etc. were the major problems as reported by the millet growing sample farmers. Apart from these problems, unavailability of adequate inputs, migration of

people, lack of trained labour, attack of pest/diseases were other problems faced by the sample farmers in the surveyed area.

- Most of the farmers expressed the problems related to the marketing of produce which involved less remunerative prices, high cost of transportation, lack of organized market place for disposal of their produce etc.

### **Conclusion and Policy implications**

- The hilly areas of Uttarakhand hold a major potential for small millet cultivation. The above findings of the present study revealed that finger millet and barnyard millet were profitable crops in the area. It was found that the net return per hectare was positive for both crops. Thus, it can be concluded that small millets cultivation is an economical and profitable venture in the study area. Further, the results indicate that the area under small millet cultivation can be expanded, including the wasteland or fallow land as these crops don't require much input material for their cultivation and can thrive even in harsh climatic conditions.
- The study revealed that small millet production is an extensive farming in the study area and was produced only for subsistence or fodder purpose. Thus, small millet farming can be commercialized so as to increase the overall profitability of the growers in the area.
- It was observed that conventional/traditional methods of farming were being followed in the region. To encourage more production per unit area, improved agronomic cultivation practices should be adopted with optimum use of fertilizers, thus improving yield and production which could result in improved profitability.
- The trends in the millet production provide a better picture with respect to area, production and productivity of crops in the study area. However, the declining area under millet cultivation is of great concern which could be addressed through policy support like incentivizing millet cultivation, opening of cluster based processing centres etc. which offers a dual advantage of creating demand alongside ensuring continuous supply.
- The marketing cost is mostly affected by the transportation and labour cost in the study area. The absence of any regulated market, government authorized mandis and any cooperative society in the region also caused a major setback in disposal of the produce by the farmers. In this regards, there is a need shift the focus on

linking farmers with government backed agencies or any other co-operative societies. This will not only help the farmer to get the fair price of their produce but will also curb the malpractices prevailing in the market place.

- There is a need to establish seed hubs at the block or village level so that demand driven production could be achieved with the distribution of quality seeds among the growers, setting up of processing units for the value addition in the nearby production area would fetch better price of the produce and thus, generate a better profit margin to the farmers.
- Further, government should frame schemes and policies regarding the production and marketing of the produce. Timely guidance to the farmers from the Department of agriculture, extension workers, researchers, policy makers and field demonstration for the transfer of new technology to the farmers' field will be of an immense help in their interest.
- There are many constraints affecting the small millet production in the study area with attack of wild animals is reported to be one of the most severe production constraints. However, the problem is non-preventable in nature but the farmers can be made aware of the crop insurance scheme to avoid the risks of losing entire crop.
- More research resources should be allocated by the institutions inward in millet research and varietal improvement programmes so that millet production can be enhanced and per unit cost of production could be minimized. Government should take initiatives to sensitize different stakeholders about the importance of millet crops in the changing scenario of climate.



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# *Appendices*



# APPENDICES

## Appendix I

Name of respondent :

Fathers name :

Village :

Block :

Mobile no.

Date of interview:

Total land holdings :

District :

### 1. Holding description

S. No.	Description	Total area (ha)	Area (ha)		Source of irrigation
			Un-irrigated	Irrigated	
1.	Owned land				
2.	Leased land				
3.	Leased out				
4.	Total cultivated				

### 2. Cropping pattern

S. No.	Kharif		Rabi		Zaid	
	Crop	Area	Crop	Area	Crop	Area

**Cost of cultivation**

**Crop enterprise information**

Crop ..... Variety ..... area.....

Irrigated area..... Unirrigated area.....

Previous crop.....

Area under previous crop.....

**A. Fixed cost**

S. No.	Particulars	Price	Purchasing year

**B. Operational cost**

S. No.	Operation		No. of operations	Human labour				Implement /tool hours
				Days	Type	Rate	Total exp	
1.	Land preparation	Finger millet						
		Barnyard millet						
2.	Manuring							
3.	Fertilizer application	Finger millet						
		Barnyard millet						
4.	Sowing/ transplanting							
5.	Irrigation							
6.	Plant protection							
7.	Harvesting							



### Permanent attached labour

Number	Sex	Age	Full or part time	Monthly salary	Other payments

### Returns from finger millet and barnyard millet

Particulars	Quantity		Price		Value	
	Finger millet	Barnyard millet	Finger millet	Barnyard millet	Finger millet	Barnyard millet
Use for family consumption						
Sale						
Other use						
Total production						

### Sale pattern and marketing channel of producer

Particulars	Quantity	Price	Value
Direct sale to consumer			
To commission agent			
To wholesaler			
To retailer			
To any other agency			

### Cost of marketing

S. No.	Particulars	Charges ( Rs. Per kg )
1.	Cost of packaging material	
2.	Transportation charges	
3.	Wastage	
4.	Loading / unloading charges	
5.	Market fee	

**Channel flow**

		Quantity produced				Purchasing price				Selling price			

**CONSTRAINTS:**

**Production constraints: YES/NO**

Adequate availability of input

Insect- pest and disease

Lack of trained labor

Lack of guidance

Fragmented land

High cost of inputs

Lack of processing facility

Climatic conditions.

Risk aversion

Other (specify)

**Marketing constraint: YES/NO**

Shortage of labour

Problem in transportation of produce

High handling cost

High marketing cost

Inadequate market information

Lack of organized marketing system

Unremunerative prices

Malpractices in the sale of produce

Lack of proper storage facilities

Lack of exposure to export market

Price fluctuation for products

Inadequate co-operation among marketing agencies

## CURRICULUM VITAE

**Name** : Ms. Anjali Rawat      **Phone Number** : 798333810  
**Mailing Address** : Siwai, Karanprayag, Chamoli, Uttarakhand      **Permanent Address** : Siwai, Karanprayag, Chamoli, Uttarakhand.  
**E-mail** : rawat98anjali@gmail.com  
**Career Objective** : To secure a recognizable position in reputable organization

### **Educational Qualification:**

S. No.	Examination Passed	Institution	Year	Percentage/ CGPA
1.	M.Sc. (Agriculture)	G. B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand	2022	7.508
2.	B.Sc. (Agriculture)	S. G. R. R. (PG) College, Dehradun, Uttarakhand	2020	78.56 %
3.	Intermediate	S. G. R. R. Public School, Dehradun.	2016	80.06 %
4.	High School	S. G. R. R. Public School, Karanprayag, Chamoli	2014	9.4/10

**Specialization:**                      **Major:** Agricultural Economics                      **Minor:** Nil

**Thesis title:** “An economic analysis on production and marketing of small millets in Chamoli district of Uttarakhand”

**Conferences/ Seminars/Workshops/Trainings Attended:** Nil

**List of papers presented in conference/seminar during degree programme:** Nil

**Software Skills:** MS Word, MS Excel, MS Power Point

**Professional Skills:** Communication skills, Interpersonal skills, Management skills

**Professional Affiliations (Membership, etc.,) :** Nil

**Awards / Honors/Achievements:** Graduate teaching/research assistantship

Place: Pantnagar  
Date:

  
(Anjali Rawat)

Name : Anjali Rawat Id. No. : 56983  
Sem. and year of admission : 1<sup>st</sup> Sem., 2020-21 Degree : M.Sc. (Ag)  
Department : Agricultural Economics  
Major : Agricultural Economics Minor : Nil  
Thesis title : “AN ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF SMALL MILLETS IN CHAMOLI DISTRICT OF UTTARAKHAND”  
Page No. : 68 Advisor : Dr. H.N. Singh

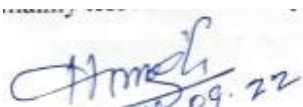
## ABSTRACT

Millets are one of the most important cereal crops that are known as nutri-cereals due to their exceptional nutritional qualities. Small millets hold a major share in the total millet production in the country producing around 12.46 million metric tonnes from an area of 8.87 million hectares. Among all the small millets, India is the topmost producer of barnyard and finger millet with 99.9% and 53.3 % share of total production, respectively. In Uttarakhand, finger and barnyard millet are the most important kharif crops after paddy and hold a vast potential to increase the production of millets.

The study was conducted in Chamoli district of Uttarakhand. The objectives were compute the trends in area, production and productivity of small millets in the district, to work out costs of and returns of its cultivation, analyze the marketing efficiency of different channels and to identify the constraints in the production and marketing of small millets. The data was collected from 60 randomly selected sample farmers pertaining to the year 2020-21 from two blocks of Chamoli district. A sample of 4 market intermediaries of each type involved in small millet marketing was also identified.

The findings of the study showed that the growth trends in area, production and productivity of finger millet to be positive and insignificant while in case of barnyard millet there was a positive and significant growth in area, production and productivity for the last ten years from 2009-10 to 2018-19. The results indicate that the cost of cultivation was found to be higher in barnyard millet than the finger millet which accounted of Rs. 61861.28 and Rs. 49894.03 per hectare, respectively. The share of imputed value of family labour was found to be highest among all the other costs for both the crops. The gross return from finger and barnyard millet cultivation was estimated to be Rs. 8820.97 and Rs. 12374.72 per hectare, respectively. The value of return per rupee expenditure in the study area was 1.17 for finger millet while for barnyard millet, it was 1.20. The most popular channel for disposal of the produce was channel II (Producer- Wholesaler-Retailer- Consumer) and marketing cost incurred by the finger and barnyard millet was Rs. 136.30 and Rs. 137.05 per qtl while the absolute margins were Rs. 661.50 and Rs. 590 per qtl, respectively.

It was observed that majority of the small millets growers reported the problem on fragmented land holdings, damage caused by the wild animals, unfavorable climatic conditions, migration of people etc. while the marketing problem associated with small millet producers were mainly less remunerative prices, high transportation costs and lack of organized market place.

  
(H. N. Singh)  
22/09/22  
Advisor

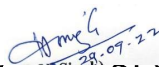
  
(Anjali Rawat)  
Authoress


नाम	: अंजलि रावत	परिचयांक	: 56983
सत्र एवं प्रवेश वर्ष	: प्रथम, 2020-2021	उपाधि	: स्नातकोत्तर (कृषि)
विभाग	: कृषि अर्थशास्त्र		
प्रमुख विषय	: कृषि अर्थशास्त्र	गौण विषय	: -
शोध शीर्षक	: "उत्तराखंड के चमोली जिले में छोटे मिलेट्स के उत्पादन और विपणन का आर्थिक विश्लेषण"		
पृष्ठ संख्या	: 68	सलाहकार	: डॉ० एच. एन. सिंह

### सारांश

मोटे अनाजों में छोटे मिलेट्स सबसे महत्वपूर्ण अनाज फसलों में से एक हैं जिसे उनके असाधारण पोषण गुणों के कारण पोषक-अनाज के रूप में भी जाना जाता है। देश में कुल मिलेट्स के उत्पादन में छोटे मिलेट्स की बड़ी हिस्सेदारी है, जो कि 8.87 मिलियन हेक्टेयर क्षेत्र से लगभग 12.46 मिलियन मीट्रिक टन का उत्पादन करता है। सभी छोटे मिलेट्स में, भारत कुल उत्पादन का 99.9% (झंगोरा और 53.3% (मंडुआ के हिस्सा के साथ झंगोरा का सबसे बड़ा उत्पादक है। उत्तराखंड में धान के बाद खरीफ की मुख्य फसलों में रागी (मंडुआ) और साँवा (झंगोरा) का स्थान है तथा उत्तराखंड राज्य भी मिलेट्स के उत्पादन को बढ़ाने की एक विशाल क्षमता रखता है। यह अध्ययन उत्तराखंड के चमोली जिले में किया गया था जिसका उद्देश्य जिले में छोटे मिलेट्स के क्षेत्र, उत्पादन और उत्पादकता में रुझानों की गणना करना, इसकी खेती की लागत व आय की गणना करना, विभिन्न चैनलों की विपणन दक्षता का विश्लेषण करना तथा छोटे मिलेट्स के उत्पादन और विपणन में बाधाओं की पहचान करना। चमोली जिले के दो प्रखंडों में वर्ष 2020-21 से संबंधित 60 यादृच्छिक रूप से चयनित किसानों से आकड़े एकत्रित किये गये। मंडुआ व झंगोरा के विपणन में शामिल प्रत्येक प्रकार के चार बाजार मध्यस्थों का एक नमूना भी तैयार किया गया था।

अध्ययन के निष्कर्षों से पता चला है कि पिछले दस वर्षों (2009-10 से 2018-19) में मंडुआ के क्षेत्रफल, उत्पादन और उत्पादकता में वृद्धि की प्रवृत्ति सकारात्मक और महत्वहीन रही है, जबकि झंगोरा के संदर्भ में सकारात्मक और महत्वपूर्ण वृद्धि हुई है। परिणामों से ज्ञात होता है कि झंगोरा की खेती की लागत मंडुआ की तुलना में अधिक पाई गई, जिसकी लागत क्रमशः रु 61861.28 और रु. 49894.03 प्रति हेक्टेयर रही। पारिवारिक श्रम के मूल्य का हिस्सा दोनों फसलों के लिए अन्य सभी लागतों में सबसे अधिक पाया गया। मंडुआ और झंगोरा की खेती से सकल लाभ क्रमशः रु 8820.97 और रु 12374.72 प्रति हेक्टेयर पाया गया। अध्ययन क्षेत्र में मंडुआ के लिए आय प्रति रुपए 1.17 पाया गया जबकि झंगोरा के लिए यह 1.20 पाया गया। उपज को बेचने के लिए सबसे लोकप्रिय चैनल II (उत्पादक- थोक व्यापारी- खुदरा विक्रेता- उपभोक्ता) था जिसमें की मंडुआ और झंगोरा की मार्केटिंग की लागत रु 136.30 और रु 137.05 प्रति विंटल जबकि कुल अन्तर (पूर्ण मार्जिन) रु. 661.50 और रु 590.00 प्रति विंटल क्रमशः पाया गया। यह पाया गया कि अधिकांश छोटे मिलेट्स उत्पादकों ने भूमि का विखण्डन जंगली जानवरों से होने वाली क्षति, प्रतिकूल जलवायु परिस्थितियों, लोगों के प्रवास आदि पर समस्या की सूचना दी, जबकि छोटे मिलेट्स उत्पादकों से जुड़ी विपणन समस्या मुख्य रूप से कम लाभकारी मूल्य, उच्च परिवहन लागत तथा संगठित बाजार स्थान की कमी बताई गई।

  
(एच. एन. सिंह)  
सलाहकार

  
(अंजलि रावत)  
लेखिका