

AERC Report

Study No. 157

**ECONOMIC ANALYSIS OF COST AND RETURN OF
OFF-SEASON VEGETABLES WITH FOCUS ON POLY HOUSE EFFECT
IN HIMACHAL PRADESH**

Meenakshi

N.K. Sharma



**Study sponsored by Ministry of Agriculture and Farmers Welfare
Government of India, New Delhi**

**Agro-Economic Research Centre
Himachal Pradesh University, Shimla**

March - 2017

ACKNOWLEDGEMENTS

The present study was undertaken at the instance of Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India, Krishi Bhawan, New Delhi with full financial endorsement. We are thankful to Sh. P.C. Bodh (Adviser, AER Division) of Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, for his guidance and necessary support in completion of the study. We are also thankful to AERC for North East India, Assam Agriculture University Jorhat for peer reviewing the report.

Our special thanks are due to Prof. A.D.N. Bajpai, Hon'ble Vice-Chancellor, Himachal Pradesh University, Summer Hill, Shimla-5. His constant encouragement, valuable guidance and supervision proved to be an important input in completing the study and making it more rich.

We are also grateful to Dr. Ramesh Chand, Director of Directorate of Agriculture, Himachal Pradesh, Dr. H.S. Baweja, Director of Directorate of Horticulture, Himachal Pradesh, Dr. R.S. Thakur, Deputy Director, Department of Agriculture, Shimla and Dr. R.K. Kaundal, Deputy Director, Mandi for their valuable support in providing necessary information/data for the study.

Sampled farmers of the study areas also deserve our thanks for their cooperation in providing required data for the study.

The authors gratefully acknowledge the support of research staff of Agro-Economic research Centre, H.P. University, Summer Hill, Shimla-5 for efficiently conducting the data collection and carrying out the analysis. Last but not least, secretarial assistance provided by Mr. Chaman Lal and word processing of the manuscript done by Mrs. Meera Verma is also duly acknowledged.

Shimla: 24th March, 2017

Officer Incharge

CONTENTS

Chapter	Page
Executive Summary	i-vi
1. Introduction	1-9
Background	1
General Features of Agriculture in H.P.	2
Off-Season Vegetables in H.P.	3
Review of Literature	4
Objectives	9
Organization of the Report	9
2. Methodology	10-13
Without Polyhouse Cultivation	10
Classification	11
Collection of Data	
Analysis of Data and	11
Computation of Cost of Cultivation	
Inside Polyhouse Cultivation	13
Limitations of the Study	13
3. Area, Production and Productivity of Vegetable Crops	14-19
Area under Vegetables	14
Production of Vegetables	15
Productivity of Vegetable Crops	17
Changes in Area Under Vegetables	18
Changes in Production Under Vegetables	18
4. Socio-Economic Profile of Selected Vegetable Growers	20-32
Age, Occupation and Literacy of the Head	20
Demographic Profile	22
Social Classification	24
Farm size and Utilization Pattern	24
Leased in and Leased out Land	25
Source of Water for Irrigation	26
Source of Water for Drinking	27

Cropping Pattern	28
Productivity of Crops	29
Area Under Off-season Vegetables Among the Sampled Farmers	29
Productivity of Vegetable Crops	30
Off-Season Vegetable Crop Rotation	31
Credit Structure of Sampled Farmers	32
5. Costs and Returns of Off-Season Vegetables	33-66
Cost of Cultivation of Vegetable Crops	33
Cost of Cultivation of Tomato	33
Cost of Cultivation of Peas	37
Cost of Cultivation of Cabbage	41
Cost of Cultivation of Cauliflower	45
Cost of Cultivation of Capsicum	49
Cost of Cultivation of Beans	53
Input-Output Analysis	56
Returns from Cultivation of Vegetable Crops	56
Returns from Cultivation of Tomato	57
Returns from Cultivation of Peas	58
Returns from Cultivation of Cabbage	59
Returns from Cultivation of Cauliflower	61
Returns from Cultivation of Capsicum	62
Returns from Cultivation of Beans	64
Input-Output Ratio	65
6. Marketing of Off-Season Vegetables	67-86
Production and Utilization of Vegetables	67
Production and Utilization of Tomato	67
Production and Utilization of Peas	68
Production and Utilization of Cabbage	69
Production and Utilization of Cauliflower	70
Production and Utilization of Capsicum	71
Production and Utilization of Beans	72
Losses in Vegetables	73
Markets for Vegetable Crops	76
Producers' Share and Marketing Margin	82
7. Off-Season Vegetables in Polyhouses	87-100
7.1. Costs and Returns of Off-Season Vegetables in Polyhouse	87
Cost of construction of Polyhouse	87
Cost of Construction of Polyhouse (250m ²)	88

Cost of Construction of Polyhouse (500m ²)	89
Cost of Construction of Polyhouse (1000m ²)	90
Cost of Cultivation of Vegetable Crops	91
Cost of Cultivation of Capsicum	91
Cost of Cultivation of Tomato	93
Net Returns From Cultivation of Vegetable Crops	94
Net Returns from Cultivation of Capsicum	94
Net Returns From Cultivation of Tomato	95
Net Returns per box From Vegetable Cultivation	95
Net Returns per box From Capsicum Cultivation	95
Net Returns per box From Tomato Cultivation	96
7.2. Marketing System of Polyhouse Vegetable Crops	97
Production and Utilization of Capsicum and Tomato	97
Marketing Pattern of Capsicum and Tomato	98
Marketing Costs of Capsicum and Tomato in Chandigarh Market	99
8. Problems Faced by Vegetable Growers	101-108
8.1. Problems in Growing Off-Season Vegetables Inside Polyhouse	101
Problems Faced in Adoption and Construction of Polyhouse	101
Problems Faced in Input Availability	102
Problems Faced in Cropping Practices	102
Problems Faced in Harvesting and Marketing	103
8.2 Problems in Growing Off-Season Vegetables Outside Polyhouse	104
Problems in Availability of Transport	104
Problems of Packing Material	105
Storage Problems	106
Problems of Market Intelligence	106
Problems of Malpractices	107
9. Conclusions and Policy Implications	109-114
Main Findings	109
Policy Implications	113
References	115-117
Reviewer comments	118
Action Taken Report	119

LIST OF TABLES

#	Table	Page
2.1.	Selection of Area	10
2.2.	Classification of Sampled Farms According to their Size of Land Holding	11
2.3.	Classification of Sampled Polyhouse Owners	13
3.1.	District-wise Area Under Different Vegetables in H.P. During 2014-15	15
3.2.	District-wise Production of Different Vegetables During 2014-15	16
3.3.	District-wise Productivity of Vegetables in H. P. During 2014-15	17
3.4.	Changes in Area Under Vegetables in H.P. During the Period 2005-06 to 2014-15	18
3.5.	Changes in Production Under Vegetables in H.P. During the Period 2005-06 to 2014-15	19
4.1(a).	Age and Occupation of the Head of the Family	21
4.1(b)	Literacy of the Head of the Family	21
4.2(a).	Demographic Profile of Sampled Farmers of District Shimla	22
4.2(b).	Demographic Profile of Sampled Farmers of District Mandi	23
4.2(c).	Demographic Profile of All Sampled Farmers	23
4.3.	Social Classification of Sampled Farmers	24
4.4.	Proportion of Various Type of Land Owned by Sampled Farmers	25
4.5.	Distribution of Leased in and Leased out Land of Sampled Farmers	26
4.6.	Average Distance of the Source of Water for Irrigation of Sample Farmers	27
4.7.	Average Distance of the Source of Drinking Water of Sampled Farmers	27
4.8.	Cropping Pattern of Sampled Farmers (Excluding Vegetables)	28
4.9.	Productivity of Various Crops Grown by Sampled Farmers (Excluding Vegetables)	29
4.10.	Area Under Different Vegetables Among Sampled Farmers	30
4.11.	Yield of Different Vegetables Grown by Sampled Farmers	31
4.12(a).	Off Season Vegetables Crop Rotation in District Shimla	31
4.12(b).	Off Season Vegetables Crop Rotation in District Mandi	32
4.13.	Credit Structure of all Sampled Farmers (for vegetables only)	32
5.1(a).	Cost of Cultivation of Tomato Among Sampled Farmers	

	of District Shimla	34
5.1(b).	Cost of Cultivation of Tomato Among Sampled Farmers of Distt. Mandi	35
5.1(c).	Cost of Cultivation of Tomato Among all the Sampled Farmers	36
5.2(a).	Cost of Cultivation of Peas Among Sampled Farmers of District Shimla	38
5.2(b).	Cost of Cultivation of Peas Among Sampled Farmers of District Mandi	39
5.2(c).	Cost of Cultivation of Peas Among all the Sampled Farmers	40
5.3(a).	Cost of Cultivation of Cabbage Among Sampled Farmers of District Shimla	42
5.3(b).	Cost of Cultivation of Cabbage Among Sampled Farmers of District Mandi	43
5.3(c).	Cost of Cultivation of Cabbage Among all the Sampled Farmers	44
5.4(a).	Cost of Cultivation of Cauliflower Among Sampled Farmers of District Shimla	46
5.4(b).	Cost of Cultivation of Cauliflower Among Sampled Farmers of District Mandi	47
5.4(c).	Cost of Cultivation of Cauliflower Among all the Sampled Farmers	48
5.5(a).	Cost of Cultivation of Capsicum Among Sampled Farmers of District Shimla	50
5.5(b).	Cost of Cultivation of Capsicum Among Sampled Farmers of District Mandi	51
5.5(c).	Cost of Cultivation of Capsicum Among all the Sampled Farmers	52
5.6(a).	Cost of Cultivation of Beans Among Sampled Farmers of District Shimla	53
5.6(b).	Cost of Cultivation of Beans Among Sampled Farmers of District Mandi	55
5.6(c).	Cost of Cultivation of Beans Among all the Sampled Farmers	56
5.7(a).	Input-Output Analysis in Tomato Production	57
5.7(b).	Input-Output Analysis in Peas Production	59
5.7(c).	Input-Output Analysis in Cabbage Production	60
5.7(d).	Input-Output Analysis in Cauliflower Production	62
5.7(e).	Input-Output Analysis in Capsicum Production	63
5.7(f).	Input-Output Analysis in Beans Production	64
5.8.	Input-Output Ratio in Various Vegetables Production Among Sampled Farmers	66
6.1(a).	Utilization Pattern of Tomato Among Sampled Farmers	68
6.1(b).	Utilization Pattern of Peas Among Sampled Farmers	69
6.1(c).	Utilization Pattern of Cabbage Among Sampled Farmers	70
6.1(d).	Utilization Pattern of Cauliflower Among Sampled Farmers	71
6.1(e).	Utilization Pattern of Capsicum Among Sampled Farmers	72
6.1(f).	Utilization Pattern of Beans Among Sampled Farmers	73

6.2(a).	Losses in Vegetables up to Market on Sampled Farms	74
6.2(b).	Losses in Vegetables up to Market on Sampled Farms	75
6.3(a).	Quantity of Tomato Marketed to Different Markets by Sampled Farmers	77
6.3(b).	Quantity of Peas Marketed to Different Markets by Sampled Farmers	78
6.3(c).	Quantity of Cabbage Marketed to Different Markets by Sampled Farmers	79
6.3(d).	Quantity of Cauliflower Marketed to Different Markets by Sampled Farmers	80
6.3(e).	Quantity of Capsicum Marketed to Different Markets by Sampled Farmers	81
6.3(f).	Quantity of Beans Marketed to Different Markets by Sampled Farmers	82
6.4(a).	Producers' Share and Marketing Margin in Marketing of Vegetables (For Chandigarh Market)	84
6.4(b).	Producers' Share and Marketing Margin in Marketing of Vegetables (For Chandigarh Market)	85
7.1.1(a).	Cost of Construction of Polyhouse (250m ²)	88
7.1.1(b).	Cost of Construction of Polyhouse (500m ²)	89
7.1.1(c).	Cost of Construction of Polyhouse (1000m ²)	90
7.1.2(a).	Cost of Cultivation of Capsicum in Polyhouse	92
7.1.2(b).	Cost of Cultivation of Tomato in Polyhouse	93
7.1.3(a).	Net Returns From Cultivation of Capsicum in Polyhouse	94
7.1.3(b).	Net Returns From Cultivation of Tomato in Polyhouse	95
7.1.4(a).	Net Returns per box and Input-Output Ratio From Cultivation of Capsicum in Polyhouse	96
7.1.4(b).	Net Returns per box and Input-Output Ratio From Cultivation of Tomato in Polyhouse	97
7.2.1.	Production and Utilization of Vegetable Crops in Sampled Polyhouses	98
7.2.2.	Marketing Pattern of Polyhouse Crops on Sampled Farms	98
7.2.3.	Marketing Costs of Capsicum & Tomato in Chandigarh Market	99
8.1.1.	Problems Faced in Adoption and Construction of Polyhouse	101
8.1.2.	Problems Faced in Input Availability	102
8.1.3.	Problems Faced in Cropping Practices	103
8.1.4.	Problems Faced in Harvesting, Storage, Packing and Marketing	103
8.2.1.	Problems in Availability of Transport Faced by Sampled Farmers	104

8.2.2. Problems of Packing Material Faced by Sampled Farmers	105
8.2.3. Problems of Storage Facility Faced by Sampled Farmers	106
8.2.4. Problems of Market Intelligence Faced by Sampled Farmers	107
8.2.5. Problems of Malpractices in Market Faced by Sampled Farmers	108

Executive Summary

Background

The hilly areas of Himachal have the special significance of unique agro-climatic conditions for the production of off season vegetables almost throughout the year. The varied topography in hills offers a best opportunity and natural glass house conditions for growing a large number of vegetables/varieties. In hilly areas, the vegetables viz. peas, tomato, beans, cauliflower, cabbage, capsicum etc. are mainly grown in various pockets or belts throughout the year as off season vegetables. Most of these vegetables grown in these areas are harvested at such a time when these are not available in plains and fetch high prices. Increased demand for vegetables due to rapid urbanisation and growing tourism, have come as boon for the growers of the hills. Polyhouse farming is an alternative new technique in agriculture gaining popularity in the farmers of Himachal Pradesh to get assured crops of off-season vegetables in those belts, where these vegetables cannot be grown throughout the year. The state and central governments are encouraging construction of polyhouses by giving subsidies to the farmers. Therefore in H.P., growing of off-season vegetables are practised in both ways i.e. with and without the help of polyhouses. Thus it becomes essential to study the costs and returns of off season vegetables grown in Himachal with and without the help of polyhouses. Keeping in view the importance of off season vegetables grown in H.P., the Ministry of Agriculture and Farmers Welfare entrusted this study to Agro Economic Research Centre, H.P. University, Shimla.

Objectives

The main objectives of the study are as under:

- To analyse the trends in area and production of vegetables in the State;
- To examine the costs and returns in various vegetables grown by farmers in the State;
- To assess the marketing costs, margins and price spread in various vegetables in different markets;
- To study the various problems faced by vegetable growers in production and marketing of vegetables in the State.

In addition to the above objectives, the following objectives are specific to off season vegetables in polyhouses.

- To study the costs and returns of off season vegetables in polyhouses;
- To study the marketing system of polyhouse vegetable crops;
- To study the problems faced by polyhouse farmers in the State.

To conduct the study on off season vegetables in the state of Himachal Pradesh six vegetables viz. tomato, capsicum, beans, peas, cabbage and cauliflower were selected for cultivation outside polyhouse and two vegetables viz. tomato and capsicum were selected for cultivation inside polyhouse. A multistage stratified random sampling technique was used in the selection of the districts, blocks, villages and finally the vegetable growers. A total sample of 120 vegetable growers of different categories, growing vegetables outside polyhouse, was selected for this study. For studying the costs, and returns of off season vegetables inside polyhouses, the information/data is taken from the study “An Economic Analysis of Protected Cultivation Under MIDH in Himachal Pradesh” (having a sample of 100 different size of polyhouses) assigned by the Ministry of Agriculture and farmers welfare, GOI to this centre for the same period.

Main Findings

The total area under various vegetables grown in the State during the year 2014-15 was 73894 hectares. The highest area was under peas (31.97%) followed by tomato (14.61%) cauliflower (7.02%), cabbage (6.52%), beans (5.09%) and capsicum (3.26%). The total production of various vegetables in the State during the year 2014-15 was 1576454 MT. The largest production was of tomato (30.19%) followed by peas (17.61%), cabbage (10.04%), cauliflower (7.44%), capsicum (3.50%) and beans (2.99%). During the period 2005-06 to 2014-15, year to year growth in the production of vegetables varied from 3.05 to 10.63 percent.

On an average, total cost (cost C) of cultivation of tomato, peas, cabbage, cauliflower, capsicum and beans (off season vegetables grown outside polyhouse) were Rs.96517, Rs.87989, Rs.93730, Rs.102187, Rs.84940 and Rs.83397 per hectare in all the sampled farms. Category wise, no specific trend appeared in the costs of these

vegetables. The material cost was the most important component of the total cost C in all the vegetables followed by the labour cost (family & hired) and rental value of owned land. The average net return over cost C realized from the cultivation of tomato, peas, cabbage, cauliflower, capsicum and beans were Rs.507121, Rs.299160, Rs.401687, Rs.456818, Rs.268630, and Rs.196296 per hectare respectively in all the sampled farms under study. The input-output ratio of tomato production was also highest (1:6.25) among all the vegetables in all the sampled farms under study. In the case of peas, cabbage, cauliflower, capsicum and beans on an average input-output ratio was 1:4.40, 1:5.29, 1:5.47, 1:4.11 and 1:3.35 in all the sampled farms under study. After tomato, cauliflower cultivation was most profitable followed by cabbage, peas, capsicum and beans.

In all the sampled farmers, there was no tendency of retaining vegetables for seed and kind wages or gifts and more than 90 percent of the total produce was sold in markets after home consumption and losses. Out of total marketed produce, 72 to 78 percent was sold in Chandigarh market, making it an important market for the study. The cost of marketing borne by vegetable growers for selling their produce in Chandigarh market worked out to be Rs.285, Rs.411, Rs.270, Rs.288, Rs.278 and Rs.332 per quintal for tomato, peas, cabbage, cauliflower, capsicum and beans respectively. Investment on commission and market fee was the main item of total marketing cost borne by the producer in all the vegetables except cabbage. The second important component of marketing cost was the cost of assembling, grading and packing. The retailer's margin was highest in tomato (9.61%) and lowest in cabbage (8.45%). The share of producer in consumer's rupee was 66.91, 66.82, 66.40, 65.62, 64.46 and 61.35 percent in capsicum, peas, beans, cabbage, cauliflower and tomato respectively.

The various problems faced by the vegetable growers (growing vegetables outside polyhouse) were lack of transportation facilities, shortage of packing material and lack of storage facilities. The prices of produce depend mainly on the market conditions, and if the growers do not have proper information regarding market, then they cannot take the advantage of high prices. The farmers were facing the problems of

getting late information, information available for few markets, inadequate information and misleading information. In most of the cases, commission agents quote lower prices than the actual one.

Two important crops, that is, capsicum and tomato grown in three different sizes, of polyhouses; namely, small, medium and large (up to 250, 500 and 1000sq. meters) were studied. The total cost of construction of a polyhouse of different sizes, i.e. small, medium and large was Rs.270860, Rs.517180 and Rs.1003740 respectively in which Rs.54172, Rs.103436 and Rs.200748 was the net cost paid by the farmers and the rest was the subsidy amount. In the selected areas, most of the polyhouses were more than five years old.

On an average, the total production of capsicum and tomato was 402 and 566 boxes per polyhouse in a year having cost per box Rs.194 and Rs.185 respectively. Out of total marketed surplus of 389 boxes of capsicum, 345 boxes i.e. 88.69 percent were marketed in Chandigarh market and rest 44 boxes i.e. 11.31 percent in the local markets. In the case of tomato, out of total marketed produce of 552 boxes, 496 boxes i.e. 90 percent were marketed in Chandigarh market and rest 56 boxes i.e. 10 percent in the local market. Their value in the market was Rs.574 and Rs.592 per box resulting in net returns of Rs.260 and Rs.407 per box. The input-output ratios were 1:4.25 and 1:5.35 for capsicum and tomato respectively.

Although the polyhouse farming was found to be profitable regarding income and employment generation, the activity is not free from problems. In most of the cases execution of the polyhouse was delayed due to the long and cumbersome clearance procedure adopted by various departments for sanctioning polyhouse and clearance of loan & subsidy. The construction was further delayed by the contractor. Delay in technology transfer was another reason due to which the polyhouses could not become operational well in time. Once a polyhouse became operational, unavailability of inputs, higher prices or poor quality of inputs were the problems faced by farmers. Lack of knowledge of most appropriate sowing time and cultural practices i.e. raising nursery and crops etc. was another major problem. The polyhouse growers also faced the problems related to harvesting, packing/processing, storage, marketing etc.

The cultivation of off season vegetables is beneficial both inside and outside polyhouse, but the cultivation inside polyhouse is certainly beneficial to the growers of those areas where this is not possible outside polyhouse.

Policy Implications

It is clear from the above that growing off season vegetables outside and inside polyhouse in Himachal Pradesh has improved the quality of life of the growers by improving income and employment. However, the profitability of these crops still can be improved by taking the following steps.

- Establishment of vegetable processing units in producing areas can improve the profitability by reducing the losses in picking, grading and packing etc. This will also solve the problem of packing material and transportation up to some extent.
- Research efforts should be made to increase the range of products (from tomato sauce and cauliflower pickle) that could be prepared from hill vegetables.
- Keeping in view the perishable nature of vegetables and variations in market prices, adequate storage facilities should be developed.
- Arrangements should be made to provide latest information regarding prices and arrivals of the vegetables in the markets.
- The emphasis should be given to expand the market and develop infrastructure by improving packing and transportation facilities.
- In the present marketing system of vegetables, most of the benefits are reaped by the middlemen. An attempt should be made to minimize middlemen margins by strengthen the marketing system by organising cooperative societies.
- The cropping practices of crop production are significantly different in polyhouses than that of in growing crops or vegetables outside the polyhouse. The growers should be given proper training related to cultural

practices i.e. raising nursery and crops, intensity of irrigation, the most appropriate sowing and harvesting time.

- The polyhouses in H.P. were prone to damage by heavy rain and storms. Polyhouses should be insured at the time of construction.

CHAPTER-1

Introduction

Background

1.1 India has a wide range of climatic and physio-geographical conditions and so is most suitable for growing various kinds of fruits and vegetables. The cultivation of tropical fruits and vegetables are confined to plains and coastal regions of India whereas sub-tropical horticultural crops are confined to the plains and foot hills of Indian mountains while the higher high regions offer a great potential for cultivating off-season vegetables and growing of temperate fruits. The hilly terrain is comprised of Himalayan range from Arunachal Pradesh in the east to Jammu and Kashmir in the north and is endowed with a variety of rich climatic and topographical conditions. These have warm valley areas as well as perennially snow-covered peaks, mid hill areas, high hill temperate and dry and cold areas. The hilly areas have the special significance of unique agro-climatic conditions for the production of off season vegetables almost throughout the year. Thus within India, Himalayas are famous for tourism, its horticultural production (especially apple) and off-season vegetables.

1.2 Vegetables are very important ingredients of our food system due to their nutritional value as these provide proteins, carbohydrates and salts that are essential ingredients for the growth of human body. Thus the demand of vegetables remains constant throughout the year and off season cultivation of high value vegetables fetch better price and provide continuous supply to the consumers. The varied topography in hills offers a best opportunity and natural glass house conditions for growing as large number of vegetables/varieties. In hilly areas, peas, tomato, beans, onion, cucumber etc. are mainly grown in various pockets or belts throughout the year as off season vegetables.

1.3 The vegetables produced in the hills during summer months are known as off-season vegetables or 'Pahari Sabziyan'. These vegetables are tasty, flavoured, delicious and of better quality which are sold at a higher rate in the plains when these cannot be grown in the plains because of high temperature. Moreover, most of these vegetables grown in these areas are harvested at such a time when these are not available in plains. These vegetables are also supplied to the reputed hotels like five star hotels and restaurants. Growing of off-season vegetables, being labour

intensive and needs skilled labour for carrying various operations and so offers better employment opportunities. Due to difficult terrain, small and scattered land holdings, all the operations need to be done manually right from ploughing to harvesting, transport to marketing etc.

1.4 Increased demand for vegetables due to rapid urbanisation and growing tourism have come as boon for the growers of the hills. So the farmers are given subsidies to construct polyhouses to get assured crops of off-season vegetables. A polyhouse works in the concept of a green houses that lets in light and traps heat inside. But instead of glass, it is made from polythen sheets of flexible plastic sheets. A poly house helps the farmers to protect crops or vegetables from sudden hailstorms or excessive rains and erratic temperature changes. Even in harsh winters, polyhouses help farmers earn from off-season cultivation. Thus in hills, growing of off-season vegetables are practised in both ways i.e. with and without the help of polyhouses. In this study both type of cultivations of off-vegetables are included.

General Features of Agriculture in H.P.

1.5 Agriculture is the main occupation of the people in Himachal Pradesh and has an important place in the economy of the State. In the state, 89.96 percent population lives in rural areas. Agriculture/Horticulture provides direct employment to about 62 per cent of total workers of the State. About 10.4 per cent of the total GSDP comes from agriculture and its allied sectors. The average holding size is about 1 hectare. Out of total land holdings 87.95 per cent area is of small and marginal. About 11.71 percent of the holdings are owned by semi-medium farmers and only 0.34 percent by large farmers. The net sown area in the State is 539462 hectares. The percentage of net irrigated area to net sown area is about 20 percent. Food-grains dominated the scene in cropping pattern followed by fruits and vegetables. The agro-climatic conditions in the State are congenial for the production of cash crops like seed potato, off season vegetables and ginger. The production of vegetables during the year 2014-15 was 1576454 MT. against 929976 MT in 2005-06. In hilly areas like Himachal Pradesh the scope for industrialization is very meagre and moreover, the unique agro-climatic conditions and sloppy and scattered land are suitable factors for the cultivation of fruits and vegetables.

Therefore, the farmers opt for high pay-off crops like fruits and off-season vegetables. These off-season vegetables generally give very high returns to the farmers as there is no competition with that of plains.

Off-Season Vegetables in Himachal Pradesh

1.6 Himachal Pradesh is endowed with a variety of rich climatic and topographical conditions suitable for growing the off-season vegetables round the year. The state has warm valley areas starting from the Shivalik hills as well as perennially snow covered peaks and also dry areas suitable for growing temperate/off-season vegetables. Thus, vegetable cultivation is fastly gaining popularity among farmers in the hill state of Himachal Pradesh which has become a natural glass house for production of off-season vegetables in the region. These off-season vegetables generally give very high returns to the farmers as there is no competition from the local produce when supplied in the market of plains because it is off-season there. This offers ready market for these crops. Thus, the State has absolute advantage in vegetable production compared to other crops. The cultivation of off-season vegetables in poly-houses also add to earnings for growers. According to state government records, small and marginal farmers comprise about 88 percent of total land holding and these are the group most affected by the vagaries of nature. The use of polyhouse for growing vegetables, promoted by the State government by offering subsidies, has increased the yield of off season vegetables of such farmers. On the basis of varied agro-climatic conditions the State can be divided into four zones:

Zone	Elevation (a.m.s.l.) in metres)	Rainfall in m.m.	Area covered	Important off-season vegetables grown
Sub-tropical	365-914	600-1000	Una, Hamirpur, adjoining areas of Kangra, Chamba, Solan, Sirmour and valley areas of Mandi district	
Sub-temperate	914-1543	900-1000	Mid hills of Kangra, Mandi, Kullu, Solan, Sirmour, adjoining areas of Shimla with Mandi, Kullu, Solan and Sirmour districts	Tomato, capsicum, beans, peas
Temperate	1523-2742	900-1000	More than 90 per cent of Kullu & Shimla districts. Ten to 20 per cent of Sirmour, Kangra, Mandi and Chamba	Cauliflower, Cabbage, beans, peas, radish, turnip & carrot
Cold & dry	1523-3656	250-400	Lahaul-Spiti 98 per cent of Kinnaur, Pangi and Bharmour Tehsils of chamba, Bara & Chota Bengal of Kangra district	Peas, cabbage and onion

The main vegetables grown in the off-season in Himachal Pradesh are cauliflower, cabbage, peas, capsicum, tomato and French beans. In those areas where land holdings are small and water supply is assured, cultivation of vegetables is most appropriate to increase income and employment. Vegetable production is both labour and capital intensive and land saving. But being fragile and perishable commodities, vegetables need special care in production, proper inputs use, assured irrigation, protection from insect/pests and diseases, rapid transport, storage and marketing.

Review of Literature

An attempt has been made to present a brief resume of work done on costs, returns and marketing of off season vegetables outside and inside polyhouses.

1.7 Singh Ranveer and Sikka, B.K. (1989) conducted a study of hill vegetables in three districts of Himachal Pradesh and found that the returns were comparatively higher in case of vegetables than other field crops. The profitability of cultivation of various vegetables showed that input output ratio was highest in cauliflower followed by tomato, cabbage, peas, beans and capsicum. The share of producer in consumer's rupee was about 49, 46, 43, 38, 34 and 33 percent in peas, cabbage, tomato, cauliflower, capsicum and beans respectively for Delhi market.

1.8 Singh, D.V.(1990) studied the production and marketing of four off-season vegetables namely, peas, tomato, cauliflower and capsicum in Himachal Pradesh. The study revealed that fertilizer application rates were far below the recommended level. Being labour intensive crops, human labour costs formed a significant proportion of total costs for all the vegetables. The cost of production calculated by various cost concepts showed that, except for peas, marketing costs form a significant proportion of total costs. The study also showed that the inputs were not efficiently used.

1.9 Singh Ranveer and Sikka, B.K. (1992) studied the costs, returns and marketing of different vegetables in Shimla, Sirmour and Solan districts of Himachal Pradesh and concluded that requirement of labour and capital was quite high in vegetable crops. Among all the vegetable crops under study both costs and returns were

highest in case of cauliflower followed by tomato, capsicum, cabbage, peas and beans. The study also revealed that vegetable crops give higher returns than other field crops and generate more employment opportunities for the farmers of the hilly areas. The share of producer in consumer's rupee was about 61.29, 48.29 and 46.78 percent in peas, cabbage and cauliflower respectively for Delhi market. The retailer's margin was higher than the whole saler's margins in all the vegetable under study.

1.10 Baba and Mann (2005) analyzed the economics and resource use efficiency of important vegetables during main-season as well as off-season under irrigated conditions of Himachal Pradesh. The study revealed that the net returns of the vegetables were found to be much higher during off-season than that of main-season vegetables, because of favourable market conditions prevailing in the country. The result of Cob-Douglas production function revealed that the expenditure on improved varieties of seed cost has positive impact on net returns. The coefficient of fertilizer expenditure appeared to be negative in case of peas, cauliflower and radish in main-season and cauliflower in off-season, indicating that cost should be minimized and the fertilizers need to be applied as per scientific package and practices. A significantly positive coefficient of irrigation expenditure in case of garlic in both the seasons suggested need for judicious application of irrigation to improve productivity. The study suggested that government should strengthen efforts in this direction by providing irrigation infrastructure in other regions, especially for off-season vegetables.

1.11 Singh Ranveer and Vaidya C.S. (2005) studied the production, marketing, storage and transportation losses of various vegetables in Himachal Pradesh. The losses were highest in cauliflower (17.57%), followed by cabbage (15.23%), tomato (13.74%), capsicum (11.81%) and peas (7.47%). The study concluded that the pre-harvest cultural practices are crucial for the reduction of post-harvest losses. Harvesting should be done in the early morning or late afternoon and avoid in wet conditions. Proper grading improves the quality and the price in the market. The plastic crates should be preferred over sending vegetables loose or packing in the box as it is economical investment. The package should provide adequate level of ventilation for sending vegetables to far away markets, post-harvest treatments help to reduce the losses in fresh produce. The surplus production may also be absorbed through establishment of processing plants in the region.

1.12 Singh, Ranveer, Vaidya, C.S. and Karol Anshuman (2006) studied the existing demand and supply of various vegetables from Himachal Pradesh and found that demand for cauliflower, cabbage, peas, tomato, capsicum, potato, carrot and broccoli tends to increase in near future. Since these vegetables are off seasonal in nature for the markets, hence Himachal had the major share in the supply of these vegetables. The study analysed the demand pattern for the next 10 year and it was found that the demand of some important vegetables requires more area for their cultivation.

1.13 Baba et al. (2010) analysed the growth of vegetables sector in relation with technology mission, extent and determinants of marketed surplus and price spread of vegetables in the Kashmir Valley. The study revealed that on an average, producers' marketed surplus has been found more than 92 per cent of the total production of selected vegetables. The price spread of vegetables with respect to various marketing channels has indicated that the producers share has an inverse relationship with the number of intermediaries. The net price received by the producer is relatively higher in the channels in which the produce is directly sold to the consumers. Across different vegetables, producers could receive higher absolute net returns in tomato, followed by brinjal and cauliflower in all the channels.

1.14 Vaidya, C.S. and Singh Ranveer (2011) studied the production and marketing of vegetables (tomato and capsicum) under protected cultivation in Himachal Pradesh. It was found that the cost of capsicum cultivation was Rs 41477 per poly house and yielded a net return of Rs. 258 per box with an input-output ratio of 1:2.26. The cost of tomato cultivation was Rs. 35255 per poly house and yielded a net return of Rs. 335 per box with an input-output ratio of 1:3.17. The producer's share in consumer's rupee was 65.79 and 59.74 for capsicum and tomato respectively.

1.15 Brij Bala et. al (2011) studied the costs and returns structure of major off-season vegetables, viz. tomato, cabbage cauliflower and peas in two vegetable-dominated developmental blocks of the district Kullu of H.P. The study revealed that per hectare cost A_1 was highest for tomato, followed by cabbage, cauliflower and lowest for peas, among the selected vegetables. However, per quintal cost of

cultivation was found to be highest for peas, followed by cauliflower, tomato and cabbage. Costs on plant protection measures were the major component of cost A_1 in all the crops followed by expenditure on seed and fertilizers. Vegetables, being the labour-intensive crops, incurred significantly high costs on human labour. Gross returns as well as net returns per hectare were observed to be highest for tomato, followed by cauliflower, cabbage and peas.

1.16 Singh Ranveer et.al.(2011) examined the marketing efficiency under traditional marketing channel (TMC) vis-à-vis emerging marketing channel (EMC) in marketing of tomato, a major vegetable crop in Himachal Pradesh. It was found that in this vegetable total marketing cost was higher (Rs.750/qtl.) in TMC. The marketing margins of various agents operating in the trade of tomato were also higher in TMC (Rs.298/qtl.) as compared to EMC (Rs.258/qtls.). Marketing efficiency was 1.95 in case of EMC and 0.50 in TMC. The study suggested that there should be the promotion of other alternative marketing channels as direct marketing to consumers, retail chains, farmers markets, contract farming etc.

1.17 Singh, S.P. (2012) studied the off-season tomato production in north western Himalayas under changing climate and found that off-season cultivation of tomato is becoming difficult due to erratic climatic conditions being faced during its growth period in the hills. Protected cultivation though costly can be adapted to mitigate the climate change. Growing tomato in naturally ventilated polyhouse with fan pad system and shading net is widely being used in mid hills of Western Himalayas. Though fully climate controlled polyhouses can be made which will make the year round cultivation of tomato feasible but the cost of the construction and operation of such polyhouses is very high which makes them un-economical therefore more emphasis is given only on the cultivation of tomato in partial climate controlled naturally ventilated polyhouses

1.18 Mishra et al. (2014) have carried out the economic analysis of marketing of major vegetables in Varanasi district of Uttar Pradesh India. The study revealed that among the organized supply chain i.e. channel (Producer-Retailer-Consumer), the cost incurred per kg of vegetables was much lower than the cost incurred in the traditional channel (Producer-Commission Agent/Adhatia-Retailer-Consumer). At the same time organized channel was found to be smallest price spread. Hence organized channel was found more efficient as compared to unorganized channel.

1.19 Tuteja U. and Subhash Chandra (2014) examined the impact of Emerging Marketing Channel (EMC), Reliance Fresh on agricultural marketing in Haryana in terms of returns, price spread and marketing efficiency vis-à-vis Traditional Marketing Channel (TMC). Results revealed that gross and net returns from selling the crops to Reliance Fresh were found to be higher than TMC. Producers received 49 and 44 per cent share of the consumer's rupee for tomato and 44 and 42 per cent share for muskmelon by disposing off produce through TMC and EMC respectively and marketing efficiency was observed to be better under the Emerging Marketing Channel.

1.20 Singh et al. (2015) studied the marketing efficiency of vegetable cultivation in Manipur and revealed that marketing efficiency is inversely related with the length of the channel. The marketing efficiency of vegetables (tomato and cabbage) in Manipur is significantly affected by marketing costs, marketing margins, open market price, volume of produce handled and cost of transport. The channel 'farmers – retailers – consumers' showed highest efficiency in vegetable marketing. A farmer's market model should be developed, particularly for vegetables with basic infrastructure such as storage, weight, drinking water, and electricity. This system successfully integrates producers with consumers/retailers, and eliminates middlemen, cuts marketing costs and provides good market infrastructure and environment.

1.21 Priscilla L. and Singh, S.P. (2015) investigated economics of vegetable production in Manipur. The result revealed that both the cost of cultivation and cost of production was found to be highest in the case of peas followed by cauliflower and cabbage. The cost incurred on human labour was found to be major cost component in the cultivation of all three vegetables. The net return was found to be highest in case of cauliflower followed by pea and cabbage cultivation. High cost of seeds and unavailability of good quality seeds were cited as the major constraints faced by the vegetable growers.

1.22 The review of literature given above indicates that the studies of off season vegetables are generally confined either to the analysis of off season vegetables in polyhouse or outside polyhouse. The present study deals with both type of cultivation of off season vegetables.

Objectives

1.23 The main objectives of the study are as under:

- To analyse the trends in area and production of vegetables in the State;
- To examine the costs and returns in various vegetables grown by farmers in the state;
- To assess the marketing costs, margins and price spread in various vegetables in different markets;
- To study the various problems faced by vegetable growers in production and marketing of vegetables in the State.

1.24 In addition to the above objectives, the following objectives are specific to off season vegetables in polyhouses.

- To study the costs and returns of off season vegetables in polyhouses;
- To study the marketing system of polyhouse vegetable crops;
- To study the problems faced by polyhouse farmers in the State.

Organization of the Report

1.25 This report is divided into nine chapters. In the introductory chapter, that is the current chapter, some background information, literature survey, objectives of the study and the plan of the study are given. The second chapter presents the detailed information on the methodology adopted in the selection of the sample, analytical tools etc. The third chapter analyses the trends in area and production of vegetables grown in the State. The profile of the sampled vegetable growers is given in fourth chapter. Analysis of the costs of cultivation and returns from vegetables, input-output ratio in vegetable production forms the subject matter of fifth chapter. Chapter sixth is concerned with production and marketing of vegetables. Marketing functions, channels, and price spread are also described in this chapter. The chapter seven is analogous to chapters five and six with special focus given to vegetables grown in polyhouses. The problems in production and marketing of vegetables grown inside and outside polyhouses are discussed in eighth chapter and chapter nine concludes the study with policy implications.

CHAPTER-2

Methodology

2.1 This chapter contains the methodology followed for selection of the study area, selection of sample, collection of data and analytical techniques used in this study. The study, based on both primary and secondary data collected from various sources, is conducted in the state of Himachal Pradesh. The study is limited to six main off-season vegetable crops, namely peas, tomato, cauliflower, cabbage, capsicum and beans outside polyhouse and two vegetables tomato and capsicum inside polyhouse.

Outside Polyhouse Cultivation

2.2 The secondary data on area, production and productivity of vegetable crops grown in H.P was collected from the Directorate of Agriculture, Himachal Pradesh. On the basis this data, a multistage stratified random sampling technique was used in the selection of the districts, blocks, villages and finally the vegetable growers. Thus initially, two districts namely; Shimla and Mandi, having highest area under vegetables, were selected. From each of these districts, one development block; that is, Theog from Shimla and Karsog from Mandi, was selected on the same basis. From each of these development blocks, a cluster of four vegetable growing villages, was identified with the help of the local officials of the department of agriculture. From each selected cluster of villages, 60 vegetable growers of different categories were selected randomly. Thus a total sample of 120 vegetable growers was selected for detailed study. The details of the districts, blocks and villages selected for the study are given below:

Table 2.1. Selection of Area

District	Block	Village
Shimla	Theog	Majhar, Kamayan, Khalasi, Chaihr
Mandi	Karsog	Pangna, Goden, Mashog, Kotlu

Classification

2.3 The selected farmers were grouped into three categories according to their land holding i.e. marginal (upto 1 ha.), small (1 to 2 ha.) and medium (above 2 ha.)

Accordingly there were 53 per cent marginal farms 32 per cent small farms, and 15 per cent medium farms in all the areas of H.P. under study.

Table 2.2. Classification of Sampled Farms According to their Size of Land Holding (No.)

Category	Districts		All
	Shimla	Mandi	
Marginal (up to 1 ha.)	34 (56.67)	30 (50.00)	64 (53.33)
Small (1-2 ha.)	16 (26.67)	22 (36.67)	38 (31.67)
Medium (above 2 ha.)	10 (16.67)	8 (13.33)	18 (15.00)
Total	60 (100)	60 (100)	120 (100)

Note. Figures in parenthesis denote the percentages.

Collection of Data

2.4 The field data for this study was collected by survey method on a pre-tested well designed questionnaires/schedule by personal interview. The required information regarding demographic profile, land holding, cropping pattern, source of irrigation, area and production of vegetables, the input application and cultivation practices followed in raising the vegetables, marketing details like grading, packing, transport and other expenses were collected from the selected vegetable growers. The nearest main consuming market of vegetables of the selected districts of Himachal Pradesh is Chandigarh vegetable market. Therefore, detailed information's regarding market charges, methods of sale etc. were collected from this market. The reference period of the study is Agriculture year 2015-16.

Analysis of Data and Computation of Cost of Cultivation

2.5 The tabular analysis was mainly used for calculating cost of cultivation, return from vegetables, utilization pattern of vegetables produced, marketed surplus, prices etc. For estimating the cost of cultivation of vegetables the standard cost concepts were used in this study:

2.6 (**Cost A₁**) This includes all the variable costs like value of hired human labour, value of bullock labour (hired and owned), hired machinery charges, value of owned machine labour, value of seed (both farm produced and purchased), value of insecticides and pesticides, value of manure (owned and purchased), value of fertilizer, depreciation of implements and farm building, irrigation charges, land

revenue, taxes, interest on working capital and miscellaneous expenses (i.e. artisan etc.).

2.7 **(Working Capital)** Working capital includes the costs of human labour (hired), bullock labour, manure, fertilizer, seed/seedlings, insecticides & pesticides and sticks. The interest will be charged at the rate of 12% per annum for a period of 3 months on the working capital as a simple interest.

2.8 **(Depreciation of Implements and Farm Building)** The depreciation is worked out on the basis of straight line method. Using this method, the yearly depreciation is computed by dividing the purchased value of an item with its expected life span. Thus, annual depreciation = purchased value / life span. If any item has a scrap value after its usefulness has expired then the annual depreciation is given by (purchased value – scrap value)/ life span.

2.9 In case more than one crop is grown on a farm it is very important to determine cost incurred on various items as are used on individual crops. While correct assessment of crop specific costs are impossible, reasonably good estimates of costs can be obtained by following the standard procedures of allocation of joint costs.

2.10 **(Cost A₂, Cost B & Cost C)** The Cost A₂ is the sum of Cost A₁ & Rent paid for leased in land; whereas Cost B = A₂+ imputed rental value of owned land(less land revenue paid thereon)+ imputed interest on owned fixed capital(excluding land) and Cost C= Cost B+ imputed value of family labour.

2.11 **(Fixed Capital)**The fixed capital includes farm buildings (excluding land), farm machineries, tools and equipments, livestock (only drought animals) etc. The interest on this cost is also calculated as in the case of working capital.

Production Efficiency

2.12 To determine the production efficiency of various vegetables the input-output ratios are calculated as follows:

Input-output ratio= Gross output in Rs. per ha./ Total input cost in Rs. Per ha.

Compound Annual Growth Rate (CAGR)

The following formula is used for the calculations of CAGR.

$CAGR = (EV / BV)^{1/n} - 1$, where EV = area or production's ending value, BV = area or production's beginning value
n = Number of years.

Inside Polyhouse Cultivation

2.13 To fulfil the objectives five, six and seven related to the costs, returns and marketing of off season vegetables inside polyhouse, the information/data is taken from the study “An Economic Analysis of Protected Cultivation Under MIDH in Himachal Pradesh” assigned by the Ministry of Agriculture and Farmers Welfare, GOI to this centre for the same period. The study is based on 100 polyhouse farmers grouped into three categories according to size of polyhouse i.e. small (upto 250 m²), medium (250m² to 500m²) and large (500m² to 1000m²). Accordingly, there were 29 small, 32 medium and 39 large polyhouse farmers under study (Table 2.3).

Table 2.3. Classification of Sampled Polyhouse Owners

District	Size class			(No.) Total
	Small (250 M ²)	Medium (500 M ²)	Large (1000 M ²)	
Mandi	8(16)	19(38)	23(46)	50(100)
Kangra	21(42)	13(26)	16(32)	50(100)
All	29(29)	32(32)	39(39)	100(100)

Note. Figures in parentheses denote percentages.

Limitations of the Study

2.14 Since the study is conducted in hilly areas which have different agro-climatic conditions from plains, the findings of the study may not be applicable to plains even for vegetable production where operational conditions are much more different from hilly areas. The data and information reported in this study is gathered from various sources and the findings of the study are based on unrecorded data pertaining to input use, production, marketing and sale price from growers who knowingly or unknowingly do not come out with actual facts. In spite of taking due care in compiling this report, the contained information may vary due to any change in any of the relevant factors e.g. agro-climatic conditions, farm management, diseases, pests, low production, market prices etc. and the actual results may differ substantially from those presented in the study.

CHAPTER – 3

Area, Production and Productivity of Vegetable Crops

3.1 The cultivation of vegetables in Himachal Pradesh is not a recent phenomena. Buck (1909) has also quoted in book “Shimla Past and Present” that a few farmers around Shimla used to grow vegetables generally for the Britishers who lived in Shimla those days. In early 50’s vegetable crops were for the domestic and local market only. Even during 1962, only few hundred tonnes of fresh vegetables used to be brought to Shimla for marketing. By 1986, vegetable production had come to be acknowledged as a good cash crop and continuously gaining popularity. The vegetables can be produced in the State due to varied climatic condition when the production of these vegetables is not economically viable and only can be produced under ideal conditions of green houses/polyhouses in controlled conditions in competing areas of neighbouring states. Keeping the importance of vegetables grown in H.P. throughout the year, an attempt has been made in this chapter to work out the changes and growth in area, production, productivity of important vegetable crops grown in the State. District-wise analysis on the area, production and productivity of vegetables is also given in this chapter.

Area Under Vegetables

3.2 In Himachal Pradesh, the main vegetables grown are peas, tomato, French beans, cabbage, capsicum and cauliflower. The area under various vegetables grown in the State during the year 2014-15 was 73894 hectares (Table 3.1). The highest area was under peas (31.97%) followed by tomato (14.61%) cauliflower (7.02%), cabbage (6.52%), beans (5.09%) and capsicum (3.26%). The area under different vegetables in all the districts of the State has also been presented in this table. The area under peas and beans is maximum (27.52% and 20.59% respectively) in Shimla district among all the districts of Himachal Pradesh whereas Solan is the leading district in growing tomato and capsicum accounting 43.52 and 46.64 per cent of the total area under tomato and capsicum in the State. The other main districts producing beans are Chamba, Kangra, Mandi, Sirmour and Kinnour

districts. The area under cauliflower and cabbage is maximum in Shimla (30.45% and 33.62%) followed by Mandi district (15.03% and 21.68%).

Table 3.1. District-wise Area Under Different Vegetables in H.P. During 2014-15 (Percentages)

Districts	Vegetables							
	Tomato	Peas	Cabbage	Cauliflower	Beans	Capsicum	Other veg.	Total Area (ha.)
Bilaspur	(26.94) {7.31}	(5.11) {0.63}	(1.19) {0.72}	(5.18) {2.93}	(2.90) {2.26}	(2.08) {2.53}	(56.58) {7.12}	2932 {3.97}
Chamba	(7.81) {2.29}	(57.58) {7.70}	(4.24) {2.78}	(0.73) {0.44}	(14.23) {11.97}	(0.41) {0.54}	(15.06) {2.04}	3161 {4.28}
Hamirpur	(3.29) {1.16}	(4.48) {0.72}	(1.58) {1.24}	(7.38) {5.39}	(2.37) {2.39}	(1.29) {2.03}	(79.60) {12.97}	3794 {5.13}
Kangra	(5.77) {4.17}	(9.40) {3.10}	(5.07) {8.20}	(7.06) {10.60}	(5.58) {11.57}	(1.83) {5.94}	(65.63) {21.96}	7794 {10.55}
Kinnaur	(2.14) {0.69}	(67.30) {9.97}	(3.80) {2.76}	(2.14) {1.44}	(10.43) {9.71}	(0.74) {1.08}	(13.43) {2.02}	3499 {4.74}
Kullu	(12.55) {6.91}	(31.28) {7.87}	(15.61) {19.26}	(10.93) {12.52}	(2.24) {3.54}	(1.24) {3.07}	(26.15) {6.68}	5946 {8.05}
Lahaul & Spiti	(0.09) {0.04}	(78.36) {13.88}	(1.62) {1.41}	(14.50) {11.69}	(0.34) {0.48}	(0.17) {0.29}	(1.83) {0.87}	4186 {5.66}
Mandi	(7.88) {7.82}	(34.39) {15.62}	(9.74) {21.68}	(7.27) {15.03}	(3.87) {11.03}	(2.56) {11.42}	(34.29) {15.79}	10729 {14.52}
Shimla	(4.53) {5.30}	(51.36) {27.52}	(12.80) {33.62}	(12.49) {30.45}	(6.11) {20.59}	(2.33) {12.25}	(10.38) {5.64}	12659 {17.13}
Sirmour	(27.50) {20.69}	(20.90) {7.19}	(3.05) {5.15}	(2.76) {4.33}	(5.35) {11.57}	(3.78) {12.75}	(36.67) {12.80}	8130 {11.00}
Solan	(48.70) {43.52}	(13.89) {5.54}	(0.80) {1.58}	(1.66) {3.02}	(5.41) {13.59}	(11.91) {46.64}	(17.60) {7.13}	9430 {12.76}
Una	(7.16) {1.08}	(3.43) {0.24}	(4.71) {1.58}	(6.79) {2.14}	(2.99) {1.30}	(2.14) {1.45}	(72.77) {5.10}	1634 {2.21}
Total Area(ha.)	(14.61) 10800	(31.97) 23623	(6.52) 4819	(7.02) 5191	(5.09) 3760	(3.26) 2408	(31.53) 23293	73894

Source: Directorate of Agriculture, Himachal Pradesh, Shimla-5

Note. Figures in () represent percentage share of area of a vegetable in total area under all vegetables in a district.

Figures in { } represent percentage share of a vegetable in total area under that vegetable in the State.

Production of Vegetables

3.3 The total production of various vegetables in the State during the year 2014-15 was 1576454 MT (Table 3.2).The table depicts that largest production was of tomato (30.19%) followed by peas (17.61%), cabbage (10.04%), cauliflower (7.44%),

capsicum (3.50%) and beans (2.99%). District-wise production of vegetables is also presented in this table. The table shows that the largest proportion of total vegetable production is from Solan district contributing 20.78 percent. The other important vegetable producing districts are Shimla, Mandi, Sirmour, Kangra and Kullu contributing 14.68, 13.48, 11.78, 10.76 and 8.03 percent of the total vegetable production in the State respectively. These districts are producing high quality vegetables which have great demand in the markets of plains.

Table 3.2. District-wise Production of Different Vegetables During 2014-15

(Percentages)

Districts	Vegetables							Total Production (tones)
	Tomato	Peas	Cabbage	Cauliflower	Beans	Capsicum	Other veg.	
Bilaspur	(37.49) {6.31}	(3.18) {0.91}	(1.83) {0.92}	(4.86) {3.33}	(1.80) {3.06}	(3.27) {4.75}	(50.73) {8.11}	80067 {5.08}
Chamba	(16.63) {1.97}	(45.18) {9.18}	(6.93) {2.47}	(1.26) {0.61}	(11.18) {13.36}	(0.59) {0.61}	(18.22) {2.05}	56408 {3.58}
Hamirpur	(9.80) {1.21}	(2.11) {0.45}	(1.52) {0.57}	(7.56) {3.80}	(1.46) {1.82}	(1.13) {1.20}	(76.60) {9.00}	58839 {3.73}
Kangra	(10.93) {3.89}	(4.97) {3.03}	(8.99) {9.63}	(7.98) {11.56}	(3.99) {14.32}	(1.31) {4.03}	(61.82) {20.95}	169556 {10.76}
Kinnaur	(4.90) {0.43}	(56.97) {8.71}	(5.88) {1.58}	(2.82) {1.03}	(9.62) {8.66}	(0.92) {0.71}	(18.89) {1.60}	42486 {2.70}
Kullu	(23.85) {6.35}	(22.02) {10.05}	(20.15) {16.12}	(10.26) {11.11}	(1.05) {2.82}	(0.73) {1.67}	(21.93) {5.55}	126671 {8.03}
Lahaul & Spiti	(0.13) {0.01}	(60.49) {11.86}	(2.75) {0.95}	(27.70) {12.89}	(0.26) {0.30}	(0.04) {0.04}	(8.63) {0.94}	54460 {3.45}
Mandi	(13.81) {6.17}	(23.05) {17.64}	(13.88) {18.64}	(7.89) {14.33}	(1.99) {8.97}	(2.00) {7.72}	(37.38) {15.88}	212551 {13.48}
Shimla	(10.33) {5.02}	(30.98) {25.81}	(27.45) {40.12}	(16.55) {32.72}	(3.56) {17.46}	(1.93) {8.07}	(9.21) {4.26}	231373 {14.68}
Sirmour	(49.99) {19.50}	(10.38) {6.94}	(5.20) {6.10}	(2.09) {3.32}	(2.69) {10.60}	(2.78) {9.33}	(26.86) {9.97}	185705 {11.78}
Solan	(70.11) {48.25}	(4.40) {5.19}	(0.81) {1.68}	(1.25) {3.49}	(2.50) {17.32}	(10.29) {60.98}	(10.65) {6.97}	327537 {20.78}
Una	(13.55) {0.88}	(1.97) {0.22}	(6.29) {1.22}	(6.91) {1.82}	(2.00) {1.31}	(1.59) {0.89}	(67.69) {4.17}	30801 {1.95}
Total Production (tones)	(30.19) 475965	(17.61) 277718	(10.04) 158301	(7.44) 117012	(2.99) 47203	(3.50) 55252	(31.73) 500255	1576454

Source: Directorate of Agriculture, Himachal Pradesh, Shimla-5

Note. Figures in () represent percentage share of production of a vegetable in total production under all vegetables in a district.

Figures in { } represent percentage share of a vegetable in total production under that vegetable in the State.

Productivity of Vegetable Crops

3.4 The yield of various vegetables grown in the districts of H.P. during the year 2014-15 is given in Table 3.3. This table reveals that in case of tomato, the yield was maximum (500 qtls./ha.) in district Solan and minimum in district Lahaul & Spiti (180 qtls./ha.). The low productivity of tomato in Lahaul & Spiti area is mainly due to extreme cold weather. However average productivity of tomato was 441 qtls./ha. in the State. The highest productivity of peas was 170 qtls./ha. in Bilaspur district whereas the average productivity in the State was 118 qtls./ha. The productivity of beans, capsicum and cabbage was also observed to be highest in Bilaspur district. Average productivity of beans, capsicum, cauliflower and cabbage was 126, 229, 225 and 328 qtls./ha. respectively. The productivity of beans and capsicum was found to be lowest i.e. 79 and 34 qtls./ha. in Lahaul & Spiti.

Table 3.3. District-wise Productivity of Vegetables in H. P. During 2014-15 (Qtls./Ha.)

Districts	Vegetables							
	Tomato	Peas	Cabbage	Cauliflower	Beans	Capsicum	Other veg.	Total
Bilaspur	380	170	420	256	170	430	245	273
Chamba	380	140	292	310	140	258	216	178
Hamirpur	461	73	149	159	96	135	149	155
Kangra	412	115	386	246	155	156	205	218
Kinnaur	277	100	188	160	112	150	171	121
Kullu	405	150	275	200	100	125	179	213
Lahaul & Spiti	180	100	220	248	79	34	233	130
Mandi	347	133	282	215	102	155	216	198
Shimla	417	110	392	242	106	151	162	183
Sirmour	415	113	390	173	115	168	167	228
Solan	500	110	350	260	160	300	210	347
Una	357	109	251	192	126	140	175	189
Total	441 (402)	118 (119)	328 (332)	225 (303)	126 (163)	229 (115)	215 ----	213 -----

Note. Figures in parenthesis denote the productivity of vegetables on sampled farms.

Changes in Area Under Vegetables

3.5 Table 3.4 shows the change in area of vegetables from year 2005-06 to 2014-15. The table reveals that in the year 2005-06 only 49.858 thousand hectares of land was under vegetable cultivation which has increased to 73.894 thousand hectares in 2014-15 with an increase of 48.21 percent. During the period of ten years considered in the table, year to year growth varied from 0.10 to 8.74 percent with the highest percentage growth in the year 2009-10.

Table 3.4. Changes in Area Under Vegetables in H.P. During the Period 2005-06 to 2014-15

Year	Area in 000' Hectares	Year to year percentage change	Percentage change from base year	CAGR (%)
2005-06	49.858	-	-	-
2006-07	52.611	5.52	5.52	5.52
2007-08	55.761	5.99	11.84	5.75
2008-09	58.743	0.10	17.82	5.62
2009-10	63.879	8.74	28.12	6.39
2010-11	65.675	1.87	31.72	5.67
2011-12	67.968	4.44	36.32	5.30
2012-13	68.865	1.32	38.12	4.72
2013-14	72.001	4.55	44.41	4.70
2014-15	73.894	2.63	48.21	4.47

Source: Directorate of Agriculture, H.P., Shimla-5

The trend equation of the above data using linear curve fitting is:

$$y = 47.94 + (2.72)x.$$

Changes in Production Under Vegetables

3.6 The Table 3.5 shows the change in production of vegetables from the year 2005-06 to 2014-2015. It reveals that in the year 2005-06 only 929976 MT vegetables were produced which increased to 1576454 MT in the year 2014-15 and the increase in the production over the year 2005-06 was 69.51 percent. The highest percentage growth was in the year 2009-10 where the production increased 10.63 percent over the previous year. During the period 2005-06 to 2014-15, year to year growth varied from 3.05 to 10.63 percent.

Table 3.5. Changes in Production Under Vegetables in H.P. During the Period 2005-06 to 2014-15

Year	Production (000'MT)	Year to year percentage change	Percentage change from the base year	CAGR (%)
2005-06	929.976	-	-	-
2006-07	1006.247	8.20	8.20	8.20
2007-08	1040.489	3.40	11.88	5.77
2008-09	1090.334	4.79	17.24	5.45
2009-10	1206.242	10.63	29.71	6.72
2010-11	1268.897	5.19	36.44	6.41
2011-12	1356.600	6.91	45.87	6.50
2012-13	1398.048	3.05	50.33	6.00
2013-14	1465.964	4.86	57.63	5.85
2014-15	1576.454	7.54	69.51	6.04

Source: Directorate of Agriculture, H.P., Shimla-5

The trend equation of the above data using linear curve fitting is:

$$Y = 844.34 + (70.83)x.$$

CHAPTER- 4

Socio-Economic Profile of Selected Vegetable Growers in Himachal Pradesh

4.1 Information about the socio-economic variables of the selected vegetable growers of the study areas reveals the conditions under which they function. The land utilization, cropping pattern etc. will give the extent of area the farmers have put under actual use. In this chapter an attempt has been made to study the socio-economic characteristics of vegetable growers of the two selected districts viz., Shimla and Mandi of Himachal Pradesh.

Age, Occupation and Literacy of the Head

4.2 Age and occupation of the head of the family of sampled households are given in Table 4.1(a) and literacy of the same in Table 4.1(b). Forty five percent heads of the family were in the age group of 41-60 years followed by the age group of 20-40 years (35%) and above 61 year (20%). The same pattern was observed in both the areas under study. The occupation of all the sampled family heads was reported to be agriculture. The proportion of literates among people is an important indicator of its quality. According to table 4.1(b), ninety percent of the people were literate. As far as area-wise literacy is concerned it was found that the literacy was higher in Shimla (93.33%) than Mandi (86.67%). Category wise there was no specific trend in literacy. Among the family heads, 38.33, 43.33 and 8.34 percent were primary, matric and graduate respectively. The proportion of matriculates was higher (46.66%) in Shimla as compare to Mandi (40%). Also, in Mandi there was no graduate among the sampled heads of the family. The literacy level of the heads in Shimla, being capital of H.P., was higher than that of Mandi.

Table 4.1(a). Age and Occupation of the Head of the Family

(Percentages)

Category	Age of the head				Occupation			
	20-40 yrs.	41-60 yrs.	Above 61 yrs.	Total	Agri.	Non-agri.	Any other	Total
Shimla								
Marginal	29.41	47.06	23.53	100	100	-	-	100
Small	50.00	37.50	12.50	100	100	-	-	100
Medium	40.00	40.00	20.00	100	100	-	-	100
All	36.67	43.13	20.00	100	100	-	-	100
Mandi								
Marginal	60.00	33.33	6.67	100	100	-	-	100
Small	9.09	63.64	27.27	100	100	-	-	100
Medium	-	50.00	50.00	100	100	-	-	100
All	33.33	46.67	20.00	100	100	-	-	100
Overall								
Marginal	43.75	40.63	15.62	100	100	-	-	100
Small	26.32	52.63	21.05	100	100	-	-	100
Medium	22.22	44.44	33.33	100	100	-	-	100
All	35.00	45.00	20.00	100	100	-	-	100

Table 4.1(b). Literacy of the Head of the Family

(Percentages)

Category	Literacy				
	Ill.	Primary	Matric	Graduate & above	Total
Shimla					
Marginal	5.88	29.41	52.95	11.76	100
Small	12.50	37.50	25.00	25.00	100
Medium	-	20.00	60.00	20.00	100
All	6.67	30.00	46.66	16.67	100
Mandi					
Marginal	20.00	60.00	20.00	-	100
Small	-	27.27	72.73	-	100
Medium	25.00	50.00	25.00	-	100
All	13.33	46.67	40.00	-	100
Overall					
Marginal	12.50	43.75	37.50	6.25	100
Small	5.26	31.58	52.63	10.53	100
Medium	11.11	33.33	44.45	11.11	100
All	10.00	38.33	43.33	8.34	100

Demographic Profile

4.3 Demographic features of sampled vegetable growers are given in Tables 4.2 (a-c). These tables reveal that in Shimla, 39.49, 36.13 and 24.37 percent were males, females and children respectively whereas these percentages were 35.15, 30.91 and 33.94 in Mandi area. The proportion of children was more in Mandi as compared to Shimla area. Overall in the study area, the percentages of males, females and children were 36.97, 38.09 and 29.94 respectively. It can also be seen from the tables that the average family size was higher (5 persons) in Mandi as compared to Shimla area (3.97 persons). Overall the average family size was 4.73 persons and it ranged between 4.42 persons in small category to 5.55 persons in medium category. The study of family size is important from the labour availability point of view. The economy of a particular area depends upon the strength of active workers. Persons between the age of 16 to 60 years are considered fit for active physical works. The proportions of male and female workers in total workers were 52.08 and 47.92 percent respectively.

**Table 4.2(a). Demographic Profile of Sampled Farmers of District Shimla
(Percentages)**

Particulates	Marginal	Small	Medium	All
Male	42.46	32.14	38.89	39.49
Female	35.62	39.29	33.33	36.13
Children	21.92	28.57	27.78	24.37
Total	100	100	100	100
Avg. Family size	4.29	3.50	3.60	3.97
Workers (16-60 yrs.)				
Male	50.94	47.36	54.54	50.60
Female	49.06	52.64	45.46	49.40
Total	100	100	100	100
Occupation	-	-	-	-
Agri. labour	-	-	-	-
Male	-	-	-	-
Female	-	-	-	-
Non-agri. labour	-	-	-	-
Male	-	-	-	-
Female	-	-	-	-

The proportion of male workers increased with the increase in the category of farmers. Area wise proportion of male workers was more in Mandi (53.21%) than

Shimla area (50.60%). In both the areas, workers were not working as agricultural labourers. There was no non-agricultural labour in Shimla district. However in Mandi district, the proportions of male and female non-agricultural labour (out of total workers) were 26.60 and 13.77 percent respectively.

Table 4.2(b). Demographic Profile of Sampled Farmers of District Mandi
(Percentages)

Particulates	Marginal	Small	Medium	All
Male	29.87	44.64	31.25	35.15
Female	31.17	33.93	25.00	30.91
Children	38.96	21.43	43.75	33.94
Total	100	100	100	100
Avg. Family size	5.13	5.09	8.00	5.00
Workers (16-60 yrs.)				
Male	48.93	56.82	55.55	53.21
Female	51.07	43.18	44.45	46.79
Total	100	100	100	100
Occupation				
Agri. labour	-	-	-	-
Male	-	-	-	-
Female	-	-	-	-
Non-agri. labour	-	-	-	-
Male	21.28	29.55	33.33	26.60
Female	10.64	15.91	16.67	13.77

Table 4.2(c). Demographic Profile of All Sampled Farmers

(Percentages)

Particulates	Marginal	Small	Medium	All
Male	36.00	40.48	34.00	36.97
Female	33.33	35.71	28.00	38.09
Children	30.67	23.81	38.00	29.94
Total	100	100	100	100
Avg. Family size	4.68	4.42	5.55	4.73
Workers (16-60 yrs.)				
Male	50.00	53.97	55.17	52.08
Female	50.00	46.03	44.83	47.92
Total	100	100	100	100
Occupation				
Agri. labour	-	-	-	-
Male	-	-	-	-
Female	-	-	-	-
Non-agri. labour	-	-	-	-
Male	10.00	20.63	20.69	15.10
Female	5.00	11.11	10.34	7.81

Social Classification

4.4 The cast-wise distribution of sampled farmers is given in Table 4.3. Overall, most of the households (85%) fall in general category and few households belong to scheduled caste (8.33%) and other backward castes (6.67%). In the case of Shimla and Mandi, 80 and 90 percent respectively belong to general category.

**Table 4.3. Social Classification of Sampled Farmers
(Percentages)**

Particulars	Marginal	Small	Medium	Total
Shimla				
SC	11.76	-	-	6.67
ST	-	-	-	-
OBC	23.53	-	-	13.33
General	64.71	100.0	100.0	80.00
Total	100.0	100.0	100.0	100.0
Mandi				
SC	20.00	-	-	10.00
ST	-	-	-	-
OBC	-	-	-	-
General	80.00	100.0	100.0	90.00
Total	100.0	100.0	100.0	100.0
Overall				
SC	15.63	-	-	8.33
ST	-	-	-	-
OBC	12.50	-	-	6.67
General	71.87	100.0	100.0	85.00
Total	100.0	100.0	100.0	100.0

Farm Size and Utilization Pattern

4.5 The average size of land holding provides the basis for judging whether a holding is good enough for cultivation. The average size of land holding was observed to be 0.56, 1.38 and 2.84 hectares for marginal, small and medium category respectively in Table 4.4. As a whole, the average land holding size was 1.16 hectares out of which 60.96, 3.44 and 35.60 percent under field crops, orchard and ghasni (grass land) respectively. Area wise the average holding size was higher (1.20 ha.) in Shimla as compared to Mandi (1.12 ha.). The area under field crops was 52 and 70.54 percent in Shimla and Mandi respectively whereas the area under orchards was observed to be 4.21 percent in Mandi and 2.61 percent in Shimla area.

Table 4.4. Proportion of Various Type of Land Owned by Sampled Farmers

District	Total land owned			Cultivated land		Orchard		Ghasni (Grass land)	Barr en	Fallo w land	O t h e r s
	Irri.	Un-irri.	Total	Field crops		Irri.	Un-irri.				
				Irri.	Un-irri.						
Shimla											
Marginal	75.00	25.00	100.0 (0.62)	68.94	1.89	6.06	0.76	22.35	-	-	-
Small	57.72	42.28	100.0 (1.49)	54.36	-	3.36	-	42.28	-	-	-
Medium	38.24	61.76	100.0 (2.72)	35.29	-	2.94	-	61.76	-	-	-
Total	55.43	44.57	100.0 (1.20)	51.44	0.55	3.99	0.22	43.80	-	-	-
Mandi											
Marginal	76.34	23.66	100.0 (0.50)	76.34	8.60	-	-	15.05	-	-	-
Small	35.96	64.04	100.0 (1.29)	33.71	37.64	2.25	-	26.40	-	-	-
Medium	16.67	83.33	100.0 (3.00)	16.67	44.00	-	4.67	34.67	-	-	-
Total	38.00	62.00	100.0 (1.12)	37.05	33.49	0.95	1.66	26.84	-	-	-
Overall											
Marginal	75.56	24.44	100.0 (0.56)	72.00	4.67	-	0.44	22.89	-	-	-
Small	45.87	54.13	100.0 (1.38)	43.12	20.49	2.75	-	33.64	-	-	-
Medium	28.13	71.88	100.0 (2.84)	26.56	20.63	1.56	2.19	49.06	-	-	-
Total	47.02	52.98	100.0 (1.16)	44.50	16.46	2.52	0.92	35.60	-	-	-

Note. Figures in parenthesis denote area in hectares/farm.

Leased in and Leased out Land

4.6 The leased in and leased out system was not prevailing among the sampled farmers under study as can be seen from Table 4.5.

**Table 4.5. Distribution of Leased in and Leased out Land of Sampled Farmers
(Area in ha./ farm)**

Category	Total land owned		Leased in (+)		Leased out (-)		Net operated	
	Irri	Un-irri	Irri	Un-irri	Irri	Un-irri	Irri	Un-irri
Shimla								
Marginal	0.46	0.16	-	-	-	-	0.46	0.02
Small	0.86	0.63	-	-	-	-	0.86	-
Medium	1.04	1.68	-	-	-	-	1.04	-
All	0.67	0.53	-	-	-	-	0.67	0.01
Mandi								
Marginal	0.38	0.12	-	-	-	-	0.38	0.04
Small	0.46	0.83	-	-	-	-	0.46	0.49
Medium	0.50	2.50	-	-	-	-	0.50	1.46
All	0.43	0.69	-	-	-	-	0.43	0.39
Overall								
Marginal	0.43	0.13	-	-	-	-	0.43	0.03
Small	0.63	0.75	-	-	-	-	0.63	0.28
Medium	0.80	2.04	-	-	-	-	0.80	0.65
All	0.54	0.62	-	-	-	-	0.54	0.20

Source of Water for Irrigation

4.7 In the sampled farms of Shimla area, the source of water for irrigation was the tank and the average distance from the irrigation source to farms was 0.650 km. while in the sampled farms of Mandi area the sources were tank and kuhl with average distance 0.027 and 0.175 km respectively (Table 4.6).

Table 4.6. Average Distance of the Source of Water for Irrigation of Sampled Farmers

(In Km.)

Categories	Source				
	Canal	Tube well	Tank	Kuhl	Others
Shimla					
Marginal	-	-	0.500	-	-
Small	-	-	0.750	-	-
Medium	-	-	1.00	-	-
All	-	-	0.650	-	-
Mandi					
Marginal	-	-	-	0.350	-
Small	-	-	0.800	-	-
Medium	-	-	-	0.550	-
All	-	-	0.027	0.175	-
Overall					
Marginal	-	-	0.266	0.175	-
Small	-	-	0.779	-	-
Medium	-	-	0.556	0.244	-
All	-	-	0.339	0.088	-

Source of Water for Drinking

4.8 Tap water was the main source of drinking water provided by the IPH department in both the areas under study. But sometimes, due to shortage of water, farmers have to depend upon the natural sources of drinking water (Table 4.7).

Table 4.7. Average Distance of the Source of Drinking Water of Sampled Farmers

(In Km.)

Category	Source		
	Natural	Tap water	Others
Shimla			
Marginal	0.5	0.051	-
Small	0.5	0.042	-
Medium	0.5	0.033	-
All	0.5	0.046	-
Mandi			
Marginal	0.6	0.047	-
Small	0.6	0.042	-
Medium	0.6	0.022	-
All	0.6	0.041	-
Overall			
Marginal	0.4	0.049	-
Small	0.4	0.042	-
Medium	0.4	0.028	-
All	0.4	0.044	-

Cropping Pattern

4.9 The analysis of cropping pattern of any area gives an overall picture of the proportion of crops sown in the area. This is influenced by quality of soil, climate, size of land holding, use of machinery, irrigation and transportation facilities etc. The total area devoted to various crops (excluding vegetables) grown in the sampled farms of Shimla and Mandi is presented in Table 4.8. It can be seen from the table that among all the sampled farmers under study, the maximum area was under maize (45.36%) followed by wheat (38.38%), barley (9.37%), fruits (4.52%) and potato (2.37%). Further, it may be observed that wheat and maize crops were most popular in both the districts. Cropping intensity is one of the important indicators of production efficiency. Cropping intensity in both the districts under study is also given in the same table. Cropping intensity (with fruits) was higher in Shimla as compared to Mandi whereas the cropping intensity (without fruits) was the same in both the districts.

Table 4.8. Cropping Pattern of Sampled Farmers (Excluding Vegetables) (Percentages)

Category	Crops								Gross cropped area (ha.)	Cropping intensity with fruits (%)	Cropping intensity without fruits (%)
	Maize	Paddy	wheat	Barley	Potato	Pulses	fruits	Others			
Shimla											
Marginal	47.80	-	47.80	-	-	-	4.40	-	1.82	209	200
Small	32.05	-	32.05	14.74	14.74	-	6.42	-	6.24	213	200
Medium	45.09	-	24.51	20.59	-	-	9.81	-	4.08	221	200
All	38.80	-	31.88	14.50	7.57	-	7.25	-	12.14	215	200
Mandi											
Marginal	50.00	-	50.00	-	-	-	-	-	4.08	200	200
Small	48.65	-	41.95	6.71	-	-	2.69	-	11.92	205	200
Medium	47.39	-	37.31	10.08	-	-	5.22	-	10.72	211	200
All	48.35	-	41.32	7.04	-	-	3.29	-	26.72	207	200
Overall											
Marginal	49.32	-	49.32	-	-	-	1.36	-	5.90	202	200
Small	42.95	-	38.55	9.47	5.07	-	3.96	-	18.16	208	200
Medium	46.76	-	33.78	12.97	-	-	6.49	-	14.80	214	200
All	45.36	-	38.38	9.37	2.37	-	4.52	-	38.96	209	200

Productivity of Crops

4.10 The productivity of various crops (excluding vegetables) is given in Table 4.9. The table reveals that the productivity of maize, wheat and barley was 18, 19 and 11 quintals per hectare respectively. The productivity of these crops is low because these crops were not the main crops in the sampled farms under study. The productivity of potato and fruits was observed to be 115 and 223 quintals per hectare respectively.

Table 4.9. Productivity of Various Crops Grown by Sampled Farmers (Excluding Vegetables)

Category	Crops (Qtls./Ha.)							
	Maize	Paddy	wheat	Barley	Potato	Pulses	Fruits	Others
Shimla								
Marginal	11.00	-	13.00	-	-	-	225	-
Small	12.00	-	13.00	10.00	115.00	-	218	-
Medium	14.00	-	15.00	11.00	-	-	230	-
All	12.59	-	11.00	10.00	115.00	-	214	-
Mandi								
Marginal	17.00	-	18.00	-	-	-	-	-
Small	18.00	-	20.00	11.00	-	-	220	-
Medium	22.00	-	23.00	12.00	-	-	225	-
All	19.41	-	17.00	11.00	-	-	223	-
Overall								
Marginal	15.00	-	16.00	-	-	-	225	-
Small	16.00	-	18.00	10.00	115.00	-	219	-
Medium	20.00	-	21.00	12.00	-	-	227	-
All	18.00	-	19.00	11.00	115.00	-	223	-

Area under Off-Season Vegetables Among Sampled Farmers

4.11 The main vegetables grown by the sampled farmers are tomato, peas, cabbage, cauliflower, capsicum and beans. The area under these vegetables crop is given in Table 4.10 which indicates that area under vegetable crops was higher in marginal category in comparison to other categories. Among the various off-season vegetables grown by sampled farmers, peas occupies prime position followed by cauliflower, beans, cabbage, capsicum and tomato in all the sampled farms. The area under all vegetables in Shimla has decreased with the increase in land holding size. This is because that the area under fruits has increased with the increase in

land holding size in this district (see Table 4.8). The same trend can be seen for small and medium categories in Mandi district. Crop wise, the proportionate area under peas was higher (43.91%) in Mandi in comparison to Shimla (32.74%). Cauliflower is also the important crop grown in both the districts under study with 24.67% in Shimla and 21.03% in Mandi. Beans is also an important crop grown in Shimla constituting 28.28 percent area of all the vegetables grown. Overall, the area under peas was maximum (37.04 ha.) followed by cauliflower (22.08 ha.), beans (18.28 ha.) and cabbage (11.52 ha.)

Table 4.10. Area Under Different Vegetables Among Sampled Farmers (Ha.)

Category	Vegetables						
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans	All
Shimla							
Marginal	-	8.88 (33.56)	3.52 (13.30)	4.96 (18.74)	1.12 (4.23)	7.98 (30.16)	26.46 (100.0)
Small	0.16 (1.12)	4.80 (33.70)	0.64 (4.49)	4.48 (31.46)	0.32 (2.25)	3.84 (26.97)	14.24 (100.0)
Medium	0.16 (1.35)	3.52 (29.73)	1.28 (10.81)	3.52 (29.73)	0.32 (2.70)	3.04 (25.60)	11.84 (100.0)
All	0.32 (0.60)	17.2 (32.74)	5.44 (10.35)	12.96 (24.67)	0.1.76 (3.35)	14.86 (28.28)	52.54 (100.0)
Mandi							
Marginal	0.96 (5.61)	8.48 (49.53)	2.72 (15.89)	3.52 (20.56)	0.64 (3.74)	0.80 (4.67)	17.12 (100.0)
Small	0.32 (1.83)	7.52 (43.12)	1.76 (10.10)	3.84 (22.02)	2.08 (11.92)	1.92 (11.00)	17.44 (100.0)
Medium	-	3.84 (43.43)	1.60 (18.18)	1.76 (20.00)	0.80 (9.10)	0.80 (9.10)	8.80 (100.0)
All	1.28 (2.95)	19.84 (43.91)	6.08 (14.02)	9.12 (21.03)	3.52 (8.12)	3.52 (8.12)	43.36 (100.0)
Overall							
Marginal	0.96 (2.20)	17.36 (39.83)	6.24 (14.32)	8.48 (19.46)	1.76 (4.04)	8.78 (20.15)	43.58 (100.0)
Small	0.48 (1.51)	12.32 (38.80)	2.40 (7.57)	8.32 (26.26)	2.40 (7.57)	5.76 (18.18)	31.68 (100.0)
Medium	0.16 (0.77)	7.36 (35.66)	2.88 (13.95)	5.28 (25.58)	1.12 (5.43)	3.84 (18.60)	20.64 (100.0)
All	1.60 (1.67)	37.04 (38.62)	11.52 (12.01)	22.08 (23.02)	5.28 (5.51)	18.28 (19.17)	95.90 (100.0)

Note. Figures in parentheses denote percentages.

Productivity of Vegetable Crops

4.12 Among other factors, increase in area under vegetables and increase in productivity would enhance the supply of vegetables. The yield of various vegetables grown on the farms of selected growers is presented in Table 4.11. This

table reveals that area wise average productivity of tomato and cabbage was higher in Shimla as compared to Mandi. Productivity of peas, cauliflower, capsicum and beans was higher in Mandi as compared to Shimla. There was no specific trend in the productivity relative to land holding size. In overall, on an average, the productivity of tomato was maximum(402 qtls./ha.) followed by cabbage (332 qtls./ha.), cauliflower (303 qtls./ha.), capsicum (163 qtls./ha.), peas (119 qtls./ha.) and beans (115 qtls./ha.)

Table 4.11. Yield of Different Vegetables Grown by Sampled Farmers
(Qtls./Ha.)

Category	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans
Shimla						
Marginal	-	115	374	250	160	116
Small	418	110	370	262	155	100
Medium	400	100	350	230	140	123
All	409	110	368	249	156	113
Mandi						
Marginal	381	130	286	388	163	115
Small	459	125	310	378	170	124
Medium	-	120	300	369	160	117
All	401	126	296	380	166	121
Overall						
Marginal	381	123	336	307	161	116
Small	446	119	326	316	168	108
Medium	400	110	322	276	154	122
All	402	119	332	303	163	115

Off-Season Vegetables Crop Rotation

4.13 The off-season vegetables crop rotation in the sampled farmers of Shimla and Mandi district can be seen in Tables 4.12 (a) and 4.12(b).

Table 4.12(a). Off Season Vegetables Crop Rotation in District Shimla

Vegetable	Irrigated		Un irrigated	
	Sowing/Planting	Harvesting	Sowing/Planting	Harvesting
Tomato	Feb, April, June	May, June, July	July	Sept.
Peas	March, Sept., Oct.	June, July	July	Sept.
Cabbage	April	June	July	Sept.
Cauliflower	April	June	July	Sept.
Capsicum	March	May	-	-
Beans	May	Aug.	July	Sept.

Table 4.12 (b). Off Season Vegetables Crop Rotation in District Mandi

Vegetable	Irrigated		Un irrigated	
	Sowing/Planting	Harvesting	Sowing/Planting	Harvesting
Tomato	Feb, April, June	May, June, July	July	Sept.
Peas	March, Sept., Oct.	June, July	July	Sept.
Cabbage	April	June	July	Sept.
Cauliflower	April	June	July	Sept.
Capsicum	March	May	-	-
Beans	May	Aug.	July	Sept.

Credit Structure of Sampled Farmers

4.14 The credit structure of all the sampled vegetable farmers is given below in Table 4.13. It can be seen from the table that farmers from all categories have taken loans only from banks. The average loan amount was maximum at Rs. 93421 for small farmers followed by Rs.54688 for marginal farmers and Rs 16111 for medium farmers. The outstanding amount was not high in any category of farmers.

Table 4.13. Credit Structure of all Sampled Farmers (for vegetables only)**(Rs./farm)**

Particulars	Marginal	Small	Medium	All
i.Source of loan				
Bank	100%	100%	100%	100%
Any other	-	-	-	-
ii.Principal amount	54688	93421	16111	61167
iii.Out standing amount	3594 (6.57)	11842(12.7)	1389 (8.62)	5875 (9.6)
Rate of interest (%)	4	4	4	4
No. of farmers taken loan	25/64	21/38	8/18	54/120

Note. Figures in parenthesis denote the percentages.

CHAPTER-5

Costs and Returns of Off-Season Vegetables

5.1 The information about the cost of cultivation of various vegetables is useful to a very wide range of users and it assumes particular importance in an era of planning in predominantly agricultural economy. The costs data also guide the users in locating the suitable areas where it is most economical to produce various commodities and the regions which would accordingly be most suitable for development of industries based on agricultural raw material. This also helps the planners to make practical recommendations for farm planning aimed at better allocation of existing resources which would increase the efficiency of production of crops. In this chapter the economic aspects of cultivation of off-season vegetables grown outside the polyhouse by sampled farmers of Himachal Pradesh are discussed in details. Costs and returns from various vegetable crops in the study areas is assessed separately. Different components of cost of cultivation for the selected off season vegetables crops are estimated according to the definitions given in Chapter 2. Further, gross income and net returns from these crops are analysed in detail. Since costs and returns of vegetable production would vary according to the farm sizes, therefore these are worked out and analysed separately for different size of land holdings.

Cost of Cultivation of Vegetable Crops

5.2 Cost of cultivation of vegetable crops includes expenses on human and bullock labour used, material costs (i.e. seed, manure, fertilizer, chemicals etc.), depreciation on implements, machinery and farm building, land revenue, rental value of land and interest on working and fixed capital. The value of family human and bullock labour used in particular crop has been estimated on the basis of the wage rate paid/payable to the hired labour for the purpose. All these costs are worked out in value terms (i.e. in rupees).

Cost of Cultivation of Tomato

5.3 Tomato is one of the most popular and important vegetable produced in Himachal Pradesh. It is considered one of the most important 'Protective Foods' as it

is the richest source of Calcium, Vitamin A, Thiamine, Ascorbic acid and Carotene-C. Besides consumption in fresh form, considerable quantities of tomato are utilized for the production of concentrates, juices, ketchup and sauces. Processing industry in tomato is sufficiently developed as compared to other vegetables.

5.4 The average cost of cultivation of tomato on different farm size in Shimla and Mandi area is presented in Tables 5.1(a-b).It can be seen from the table 5.1(a) that tomato is not cultivated by the marginal category of district Shimla. The average cost of tomato among the sampled farmers of Shimla area was Rs.97183 per hectare.

Table 5.1(a). Cost of Cultivation of Tomato Among Sampled Farmers of District Shimla

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	0	13200	14000	13600	0	13.57	14.42	13.99
b. Bullock Labour	0	4800	4600	4700	0	4.93	4.74	4.84
c.Seed/Seedlings	0	6250	7200	6725	0	6.42	7.42	6.92
d.Manure	0	18750	16250	17500	0	19.27	16.74	18.01
e.Fertilizer	0	4500	4650	4575	0	4.62	4.79	4.71
f.Insecticides and pesticides	0	8000	8500	8250	0	8.22	8.76	8.49
g.Sticks	0	1275	1350	1313	0	1.31	1.39	1.35
h.Depreciation (Implements and farm building)	0	256	276	266	0	0.26	0.28	0.27
i.Land Revenue and taxes	0	18	18	18	0	0.02	0.02	0.02
j.Interest on working capital	0	1703	1696	1700	0	1.75	1.75	1.75
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0	0	0	0	0	0.00	0.00	0.00
Total (Cost A ₁)	0	58752	58740	58646	0	60.38	60.31	60.35
l.Rent paid for leased in land	0	0	0	0	0	0.00	0.00	0.00
Cost A ₂ (Cost A ₁ +l)	0	58752	58540	58646	0	60.38	60.31	60.35
m.Rental value of owned land	0	25000	26235	25618	0	25.69	27.03	26.36
n.Interest on fixed capital (excluding land)	0	1002	1036	1019	0	1.03	1.07	1.05
Cost B (Cost A ₂ +m+n)	0	84754	85811	85283	0	87.10	88.41	87.75
o.Imputed value of family labour	0	12550	11250	11900	0	12.90	11.59	12.25
Cost C (Cost B+o)	0	97304	97091	97183	0	100	100	100

The total cost of cultivation was slightly higher (Rs.97304/ha.) in the case of small category as compared to medium category (Rs.97091/ha.). Material cost (cost of seed/seedlings, manure, fertilizer, insecticides and pesticides) was the major cost component constituting 39.48 percent of the total cost followed by labour cost (human and bullock) i.e. 31.08 percent and rental value of land (26.34%). It was also observed that the farmers were also aware of the benefits of plant protection measures and they spent 8.49 percent on insecticides and pesticides. On an average 0.27 percent of the cost C incurred on land revenue, 1.75 percent on interest on working capital and 1.05 percent on interest on fixed capital.

Table 5.1(b). Cost of Cultivation of Tomato Among Sampled Farmers of Distt. Mandi

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Med.	All	Marginal	Small	Med	All
a.Human Labour (Hired)	13570	14430	0	13785	14.26	14.44	0	14.31
b. Bullock Labour	4870	4750	0	4840	5.12	4.75	0	5.02
c.Seed/Seedlings	6050	6550	0	6175	6.36	6.55	0	6.41
d.Manure	16250	18750	0	16875	17.08	18.76	0	17.51
e.Fertilizer	4650	4575	0	4631	4.89	4.58	0	4.81
f.Insecticides and pesticides	7880	8000	0	7910	8.28	8.00	0	8.21
g.Sticks	1170	1250	0	1190	1.23	1.25	0	1.24
h.Depreciation (Implements and farm building)	252	272	0	257	0.26	0.27	0	0.27
i.Land Revenue and taxes	18	18	0	18	0.02	0.02	0	0.02
j.Interest on working capital	1633	1749	0	1662	1.72	1.75	0	1.72
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0	0	0	0	0.00	0.00	0	0.00
Total (Cost A ₁)	56343	60344	0	57343	59.22	60.87	0	59.52
l.Rent paid for leased in land	0	0	0	0	0.00	0.00	0	0.00
Cost A ₂ (Cost A ₁ +l)	56343	60344	0	57343	59.22	60.37	0	59.52
m.Rental value of owned land	26230	25798	0	26122	27.57	25.81	0	27.11
n.Interest on fixed capital (excluding land)	1025	1042	0	1029	1.08	1.04	0	1.07
Cost B (Cost A ₂ +m+n)	83598	87184	0	84495	87.86	87.22	0	87.69
o.Imputed value of family labour	11550	12775	0	11855	12.14	12.78	0	12.31
Cost C (Cost B+o)	95148	99959	0	96351	100	100	0	100

Table 5.1(b) presents the various cost components of tomato cultivation among the sampled farmers of Mandi area. The table reveals that tomato is not cultivated by the medium category of Mandi district. The average total cost per hectare worked out to be more (Rs.99959/ha.) in case of small category as compared to marginal category (Rs.95148/ha.). On an average cost C was Rs.96351 per hectare among the sampled farmers of Mandi area.

Table 5.1 (c). Cost of Cultivation of Tomato Among all the Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	13570	14020	14000	13748	14.26	14.14	14.42	14.24
b. Bullock Labour	4870	4767	4600	4812	5.12	4.81	4.74	4.99
c.Seed/Seedlings	6050	6450	7200	5285	6.36	6.51	7.42	6.51
d.Manure	16250	18750	16250	17000	17.08	18.93	16.74	17.61
e.Fertilizer	4650	4550	4650	4620	4.89	4.59	4.79	4.79
f.Insecticides and pesticides	7880	8000	8500	7978	8.28	8.07	8.76	8.27
g.Sticks	1170	1258	1350	1215	8.23	1.27	1.39	1.26
h.Depreciation (Implements and farm building)	252	267	276	259	0.26	0.27	0.28	0.27
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1633	1733	1696	1670	1.72	1.75	1.75	1.73
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0	0	0	0	0.00	0.00	0.00	0.00
Total (Cost A ₁)	56343	59813	58540	57604	59.22	60.37	60.31	59.68
l.Rent paid for leased in land	0	0	0	0	0.00	0.00	0.00	0.00
Cost A ₂ (Cost A ₁ +l)	56343	59813	58540	57604	59.22	60.37	60.31	59.68
m.Rental value of owned land	26230	25532	26235	26021	27.57	25.77	27.03	26.96
n.Interest on fixed capital (excluding land)	1025	1029	1036	1027	1.08	1.04	1.07	1.06
Cost B (Cost A ₂ +m+n)	83598	86374	85811	84652	87.86	87.18	88.41	87.71
o.Imputed value of family labour	11550	12700	11250	11865	12.14	12.82	11.59	12.29
Cost C (Cost B+o)	95148	99074	97061	96517	100	100	100	100

5.6 Material cost was the major cost component constituting 38.18 percent of the total cost followed by the cost of labour (26.62%) Among material cost, expenses on manure was the main component accounting for 17.08 and 18.76 percent (of the cost C) in marginal and small category respectively. The second main item of material cost was the value of insecticides and pesticides which accounts for Rs.7910/ha. (8.21% of total cost). The value of seed/seedlings accounts for 6.41 percent of the total cost. The rental value of land was observed to be 27.57 and 25.81 percent in marginal and small category.

5.7 On an average, total cost of cultivation of tomato was Rs.96517/ha. on all the sampled farms as given in Table 5.1(c). Material cost, being the major cost component in both the districts, constituted 37.44 percent of the total cost followed by labour cost i.e. 31.52 percent and rental value of owned land 26.96 percent in overall. The share of manure was observed to be 17.61 percent followed by that of insecticides and pesticides (8.27%), seed/seedlings (6.51%), fertilizer (4.79%) and sticks (1.26%). The bullock labour was about 5 percent of the cost C. On the whole, the amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.27, 0.02, 1.73 and 1.06 percent respectively.

Cost of Cultivation of Peas

5.8 Being a good vegetable and pulse crop, Peas occupy a position of considerable importance. It is highly nutritious and contains high percentage of protein, carbohydrates and vitamins. It is grown in all parts of the State under different climatic conditions.

5.9 The average cost of cultivation of peas among different categories of farmers of Shimla and Mandi areas is given in Tables 5.2 (a-b). The cultivation of peas was observed in sampled farmers of both the areas and in all the categories of farmers. Table 5.2 (a) reveals that in Shimla, total cost of cultivation of peas was Rs.89979, Rs.86674 and Rs.84569 in marginal, small and medium categories of farmers respectively there by showing a decreasing trend with the increase in the size of farm. On an average, the total cost of cultivation of peas among the sampled farmers of Shimla was Rs.87950 per hectare. Again, material cost was the major component in total cost contributing 35.17 percent followed by labour cost (family and bullock) 32.73 percent and rental value of owned land 29.62 percent. The table

also shows that the labour requirement increases with the increase in the farm size particularly the hired labour. The proportion of manure is decreasing with the increase in the farm size whereas proportion of fertilizer is showing a reverse trend. This is due to the reason that the marginal and small farmers having small land holdings are applying larger quantities of manure. Value of manure was the major cost component constituting 22.08 percent of the total cost. The other components of cost of cultivation of peas are depreciation (0.25%), land revenue (0.02), interest on working capital (1.61%) and interest on fixed capital (1.19%).

Table 5.2 (a). Cost of Cultivation of Peas Among Sampled Farmers of District Shimla

Cost Components	Value in (Rs./ha.)				Percentage			
	Margi.	Small	Medium	All	Margi.	Small	Medium	All
a.Human Labour (Hired)	10880	12270	12670	11634	12.09	14.16	14.98	13.23
b. Bullock Labour	4800	4650	4445	4685	5.33	5.36	5.26	5.33
c.Seed/Seedlings	4450	4620	5000	4610	4.95	5.33	5.91	5.24
d.Manure	21313	18870	15380	19417	23.69	21.77	18.19	22.08
e.Fertilizer	2250	2688	2875	2500	2.50	3.10	3.40	2.84
f.Insecticides and pesticides	4789	3875	4150	4403	5.32	4.47	4.91	5.01
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	216	228	236	223	0.24	0.26	0.28	0.25
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1454	1409	1336	1417	1.62	1.63	1.58	1.61
k.Misc. exp. (Machinery, water,elect.Charges etc.)	0	0	0	0	0	0	0	0
Total (Cost A ₁)	50170	48628	46110	48909	55.76	56.10	54.52	55.61
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	50170	48628	46110	48909	55.76	56.10	54.52	55.61
m.Rental value of owned land	25225	25750	25980	25526	28.03	29.71	30.72	29.02
n.Interest on fixed capital (excluding land)	1036	1056	1079	1050	1.15	1.22	1.28	1.19
Cost B (Cost A ₂ +m+n)	76431	75434	73169	75485	84.94	87.03	86.52	85.83
o.Imputed value of family labour	13548	11240	11400	12464	15.06	12.97	13.48	14.17
Cost C (Cost B+o)	89979	86674	84569	87950	100	100	100	100

5.10 Table 5.2 (b) reveals that the average cost of cultivation of peas in Mandi area was Rs.89177, Rs.87372 and Rs.86748 among marginal, small and medium categories of farmers respectively which is inversely related with the size of farm. Here also material cost is the major cost component constituting 33.98 percent of the total cost followed by rental value of land (30.03%) and labour cost (27.74%). Again the expenditure on manure was proportionately higher among marginal and small farms than large farms showing inverse relationship with the size of farm. On the whole, proportion of seed, value of insecticides and pesticides, in total cost, was 5.33 and 4.64 percent respectively.

Table 5.2(b). Cost of Cultivation of Peas Among Sampled Farmers of District Mandi

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	11870	12575	12430	12246	13.31	14.39	14.33	13.91
b. Bullock Labour	4500	4630	4495	4548	5.05	5.30	5.18	5.17
c.Seed/Seedlings	4550	4700	5000	4694	5.10	5.38	5.76	5.33
d.Manure	20250	18000	16000	18575	22.71	20.60	18.44	21.10
e.Fertilizer	2350	2748	2675	2564	2.64	3.15	3.08	2.91
f.Insecticides and pesticides	4200	3950	4078	4082	4.71	4.52	4.70	4.64
g.Sticks	0	0	0	0	0	0.00	0.00	0.00
h.Depreciation (Imple. and farm building)	212	224	232	220	0.24	0.26	0.27	0.25
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1432	1398	1340	1401	1.61	1.60	1.54	1.59
k.Misc. exp. (Machinery, water,elect.Charges etc.)	0	0	0	0	0.00	0.00	0.00	0.00
Total (Cost A ₁)	49382	48243	46268	48348	55.38	55.22	53.34	54.93
l.Rent paid for leased in land	0	0	0	0	0.00	0.00	0.00	0.00
Cost A ₂ (Cost A ₁ +l)	49382	48243	46268	48348	55.38	55.22	53.34	54.93
m.Rental value of owned land	26250	26375	26950	26433	29.44	30.19	31.07	30.03
n.Interest on fixed capital (excluding land)	1045	1084	1098	1070	1.17	1.24	1.27	1.22
Cost B (Cost A ₂ +m+n)	76677	75702	74316	75850	85.98	86.64	85.67	86.17
o.Imputed value of family labour	12500	11670	12430	12172	14.02	13.36	14.33	13.83
Cost C (Cost B+o)	89177	87372	86746	88022	100	100	100	100

Depreciation, land revenue, interest on working and fixed capital accounted for 0.25, 0.02, 15.9 and 1.22 percent of the total cost of peas respectively.

5.11 On an average total cost of cultivation of peas was higher in Mandi area as compared to Shimla area. The overall cost in peas cultivation was observed to be Rs.87989 per hectare among all the sampled farmers (Table 5.2(c)). Over all, cost C was Rs.89587, Rs.87100 and Rs.85705 among marginal, small and medium category of farmers respectively.

Table 5.2(c). Cost of Cultivation of Peas Among all the Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	11364	12456	12545	11962	12.68	14.30	14.64	13.59
b. Bullock Labour	4653	4638	4471	4612	5.19	5.32	5.22	5.24
c.Seed/Seedlings	4499	4669	5000	4655	5.02	5.36	5.83	5.29
d.Manure	20794	18339	15703	18966	23.21	21.06	18.32	21.55
e.Fertilizer	2299	2725	2771	2534	2.57	3.13	3.23	2.88
f.Insecticides and pesticides	4501	3920	4112	4231	5.02	4.50	4.80	4.81
g.Sticks	0	0	0	0	0	0	0.0	0
h.Depreciation (Imple. and farm building)	214	226	234	222	0.24	0.26	0.27	0.25
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1443	1402	1338	1409	1.61	1.61	1.56	1.60
k.Misc. exp. (Machinery, water,elect.Charges etc.)	0	0	0	0	0	0	0	0
Total (Cost A ₁)	49785	48393	46192	48608	55.57	55.56	53.90	55.24
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	49785	48393	46192	48608	55.57	55.56	53.90	55.24
m.Rental value of owned land	25726	26131	26486	26012	28.72	30.00	30.90	29.56
n.Interest on fixed capital (excluding land)	1040	1073	1089	1061	1.16	1.23	1.27	1.21
Cost B (Cost A ₂ +m+n)	76551	75598	73767	75681	85.45	86.79	86.07	86.01
o.Imputed value of family labour	13036	11502	11937	12308	14.55	13.21	13.93	13.99
Cost C (Cost B+o)	89587	87100	85705	87989	100	100	100	100

5.12 In material cost value of manure was the major item accounting for 21.55 percent of the total cost followed by value of seed (5.29%), insecticides and pesticides (4.81%) and fertilizer (2.88%). The proportion of seed used in peas cultivation was positively related with the farm size. Labour cost was the second major cost component constituting 27.58 percent of the total cost. Hired human labour constituted 13.59 percent of the total cost whereas the share of family and bullock labour was 13.99 and 13.59 percent respectively of the cost C. The medium category was observed to be using more hired labour as compared to other categories. The average rental value of land constituted 29.56 percent of the total cost. Depreciation, land revenue, interest on working and fixed capital accounted for 0.25, 0.02, 1.59 and 1.22 percent of the total cost of peas respectively.

Cost of Cultivation of Cabbage

5.13 It is one of the important cash crops grown in Himachal Pradesh. The cabbage is rich in minerals and vitamin C, B, B₂, and A. The average cost of cultivation of cabbage on different farm sizes in Shimla is given in Table 5.3(a). The table shows that the average total cost of cultivation of cabbage was Rs.94144 per hectare among all the categories. The total cost in cultivation of cabbage ranged between Rs.92087 to Rs.95123 per hectare between the categories. The medium category farmers used less manure and insecticides/pesticides resulting in low cost of cultivation.

5.14 The components of material cost, that is, manure, seed/seedling, insecticides & pesticides and fertilizer were 17.38, 7.28, 6.76 and 5.81 percent of the total cost. Category wise, the proportion of manure decreases as the size of farm increases. Labour cost was worked out to be 32.42 percent of the total cost of cabbage in which 5.19 percent was the bullock labour cost. After material and labour cost, rental value of owned land is the significant cost constituting 27.33 percent of the total cost. The remaining items of the cost of cultivation of cabbage were depreciation (0.22%) land revenue (0.02%), interest on working capital (1.67%) and interest on fixed capital (1.12%).

5.15 The average total cost of cultivation of cabbage in the case of Mandi was observed to be Rs.93412 per hectare (Table 5.3(b)). Although, cost C of cabbage is showing an increasing trend with the increase in the farm size, but there is not a

significant difference in cost C among the sampled farmers of different categories. In the labour cost, the proportion of hired human labour was observed to be more i.e. 14.37 percent as compared to the family labour i.e. 13.05 percent. The proportion of rental value of land was found to be 27.32 percent. The share of material cost, depreciation, land revenue, interest on working capital and interest on fixed capital in the case of cabbage in Mandi was almost same as in Shimla.

Table 5.3(a). Cost of Cultivation of Cabbage Among Sampled Farmers of District Shimla

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a. Human Labour (Hired)	12688	12000	12348	12527	13.34	12.92	13.41	13.31
b. Bullock Labour	5048	4420	4678	4887	5.31	4.76	5.08	5.19
c. Seed/Seedlings	6769	6875	7085	6856	7.12	7.40	7.69	7.28
d. Manure	16870	15975	15150	16360	17.73	17.20	16.45	17.38
e. Fertilizer	5678	5049	5108	5470	5.97	5.44	5.55	5.81
f. Insecticides and pesticides	6673	6454	5455	6361	7.02	6.95	5.92	6.76
g. Sticks	0	0	0	0	0	0	0	0
h. Depreciation (Imple. and farm building)	196	216	224	205	0.21	0.23	0.24	0.22
i. Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j. Interest on working capital	1612	1523	1495	1574	1.69	1.64	1.62	1.67
k. Misc. exp. (Machinery, water, elect. Charges etc.)	0	0	0	0	0	0	0	0
Total (Cost A ₁)	55552	52530	51561	54257	58.40	56.56	55.99	57.63
l. Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	55552	52530	51561	54257	58.40	56.56	55.99	57.63
m. Rental value of owned land	25550	25930	26120	25729	26.86	27.92	28.36	27.33
n. Interest on fixed capital (excluding land)	1043	1065	1078	1054	1.10	1.15	1.17	1.12
Cost B (Cost A ₂ +m+n)	82145	79525	78759	81040	86.36	85.63	85.53	86.08
o. Imputed value of family labour	12978	13350	13328	13104	13.64	14.37	14.47	13.92
Cost C (Cost B+o)	95123	92875	92087	94144	100	100	100	100

Table 5.3(b). Cost of Cultivation of Cabbage Among Sampled Farmers of District Mandi

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	13650	12775	13750	13423	14.65	13.68	14.65	14.37
b. Bullock Labour	4950	4530	4675	4756	5.31	4.85	4.98	5.09
c.Seed/Seedlings	6570	6775	6985	6739	7.05	7.26	7.44	7.21
d.Manure	15880	16950	15450	16077	17.04	18.15	16.47	17.21
e.Fertilizer	5550	5245	5060	5333	5.96	5.62	5.39	5.71
f.Insecticides and pesticides	6500	6300	6600	6468	6.97	6.75	7.03	6.92
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	244	268	280	260	0.26	0.29	0.30	0.28
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1593	1577	1576	1584	1.71	1.69	1.68	1.70
k.Misc. exp. (Machinery, water, elect.Charges etc.)	0	0	0	0	0	0.0	0	0
Total (Cost A ₁)	54955	54438	54394	54658	58.97	58.30	57.97	58.51
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	54955	54438	54394	54658	58.97	58.30	57.97	58.51
m.Rental value of owned land	25230	25540	26000	25522	27.07	27.35	27.71	27.32
n.Interest on fixed capital (excluding land)	1030	1042	1067	1043	1.11	1.12	1.14	1.12
Cost B (Cost A ₂ +m+n)	81215	81020	81461	81223	87.15	86.77	86.82	86.95
o.Imputed value of family labour	11978	12350	12370	12189	12.85	13.23	13.18	13.05
Cost C (Cost B+o)	93193	93370	93831	93412	100	100	100	100

5.16 On an average, the total cost of cultivation of cabbage among all the sampled farmers was Rs.93730 per hectare (Table 5.3(c)) which is near to the total costs of different categories. The material costs used in cultivation of cabbage was 36.66 percent of the total cost having the contribution of seed/seedlings, manure, fertilizer and insecticides and pesticides 7.25, 17.32, 5.75 and 6.84 percent. The proportion of insecticides and pesticides was inversely related with the farm size. Labour cost was the second major cost component accounting for 32.44 percent of the total cost. The share of family, hired and bullock labour was 13.47, 13.85 and 5.12 percent of the cost C. Depreciation, land revenue, interest on working capital and interest on fixed capital constituted 0.25, 0.02, 1.68 and 1.12 percent respectively of the total cost.

Table 5.3(c). Cost of Cultivation of Cabbage Among all the Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a. Human Labour (Hired)	13107	12568	13127	12977	13.90	13.48	14.11	13.85
b. Bullock Labour	5005	4501	4676	4801	5.31	4.83	5.03	5.12
c. Seed/Seedlings	6682	6802	7029	6794	7.09	7.29	7.55	7.25
d. Manure	16438	16690	15317	16236	17.44	17.90	16.46	17.32
e. Fertilizer	5622	5193	5081	5387	5.96	5.57	5.46	5.75
f. Insecticides and pesticides	6598	6340	6092	6414	7.00	6.80	6.55	6.84
g. Sticks	0	0	0	0	0	0	0	0
h. Depreciation (Imple. and farm building)	217	254	255	235	0.23	0.27	0.27	0.25
i. Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j. Interest on working capital	1605	1563	1540	1578	1.70	1.68	1.65	1.68
k. Misc. exp. (Machinery, water, elect. Charges etc.)	0	0	0	0	0	0	0	0
Total (Cost A ₁)	55292	53929	53135	54440	58.65	57.84	57.10	58.08
l. Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	55292	53929	53135	54440	58.65	57.84	57.10	58.08
m. Rental value of owned land	25411	25644	26053	25621	26.95	27.50	28.00	27.33
n. Interest on fixed capital (excluding land)	1037	1048	1072	1048	1.10	1.12	1.15	1.12
Cost B (Cost A ₂ +m+n)	81740	80621	80260	81110	86.70	86.47	86.25	86.53
o. Imputed value of family labour	12542	12617	12796	12621	13.30	13.53	13.75	13.47
Cost C (Cost B+o)	94282	93238	93056	93730	100	100	100	100

Cost of Cultivation of Cauliflower

5.17 The cauliflower is one of the important vegetable crops. In Himachal Pradesh it is grown in all the seasons. It is a delicate crop and needs more care to grow successfully than most of the other vegetables. It is a good source of vitamin C.

5.18 The average cost of cultivation of cauliflower among the sampled farmers of Shimla area is presented in Table 5.4(a). It can be seen from this table that the average total cost of cultivation of cauliflower in Shimla was Rs.103115 per hectare. The cost of cultivation of this crop was maximum (Rs.105026/ha.) in marginal farms and minimum in small farms (Rs.101351/ha.). Among various components of total cost of cultivation of cauliflower the value of human labour accounted for 24.25 percent of the total cost. The value of human labour utilized in cultivation of cauliflower was maximum (24.90%) in small farms and minimum in marginal farms (23.50%). The value of bullock labour constitutes 4.46 percent of the total cost of cultivation of cauliflower among the sampled farmers of Shimla district. On an average, the proportion of material costs was 42.44 percent of the cost C. In material cost, expenses on manure was the major cost component which accounted for 20.58 percent of cultivation of cauliflower followed by the expenses on seed/seedlings (7.82%), fertilizer (7.03%) and insecticides and pesticides (7.01%). Further, this table reveals that small farmers spent relatively higher on insecticides & pesticides as compared to other farmers. The utilization of manure and fertilizer was observed to be higher in marginal farmers. The imputed rental value of land was higher (26.39%) in small farms and lesser (25.08%) in marginal farms. On the whole, this cost accounted for 25.83 percent of the total cost of cauliflower. Interest on working and fixed capital constituted 1.77 and one percent of the total cost respectively. Depreciation and land revenue were found to be very low 0.25 and 0.02 percent of the total cost of cauliflower.

5.19 Table 5.4 (b) presents the various cost components of cauliflower cultivation among the sampled farmers of Mandi area. It can be seen from the table that the average total cost of cultivation of cauliflower in Mandi was 100700 per hectare. The total cost of cauliflower was maximum (Rs.101658/ha.) in medium farms and minimum (Rs.99708/ha.) in small farms. On an average, the proportion of material cost was 39.11 percent of the total cost of this crop. In material cost, cost on manure

was the main component accounting for 17.28 percent of the total cost and the proportion of the cost on manure in total cost decreased with the increase in the size of farm. On an average value of human labour accounted for 26.98 percent of cost C. Category wise labour cost is showing an increasing trend with the increase in the farm size. In the remaining cost components rental value of land is the important cost component accounting for 26.28 percent of the total cost.

Table 5.4(a). Cost of Cultivation of Cauliflower Among Sampled Farmers of District Shimla

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	12300	12575	12250	12381	11.71	12.41	11.93	12.01
b. Bullock Labour	4800	4390	4600	4604	4.57	4.33	4.48	4.46
c.Seed/Seedlings	8448	7237	8557	8059	8.04	7.14	8.33	7.82
d.Manure	22650	20620	19970	21220	21.57	20.35	19.45	20.58
e.Fertilizer	7665	6836	7178	7246	7.30	6.74	6.99	7.03
f.Insecticides and pesticides	7280	7197	7179	7224	6.93	7.10	6.99	7.01
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	244	268	280	262	0.23	0.26	0.27	0.25
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1894	1766	1792	1822	1.80	1.74	1.75	1.77
k.Misc. expenditure	0	0	0	0	0	0	0	0
Total (Cost A ₁)	65299	60907	61824	62837	62.17	60.10	60.22	60.94
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	65299	60907	61824	62837	62.17	60.10	60.22	60.94
m.Rental value of owned land	26340	26750	26890	26631	25.08	26.39	26.19	25.83
n.Interest on fixed capital (excluding land)	1007	1035	1054	1029	0.96	1.02	1.03	1.00
Cost B (Cost A ₂ +m+n)	92646	88692	89768	90498	88.21	87.51	87.44	87.76
o.Imputed value of family labour	12380	12659	12900	12618	11.79	12.49	12.56	12.24
Cost C (Cost B+o)	105026	101351	102668	103115	100	100	100	100

Table 5.4(b). Cost of Cultivation of Cauliflower Among Sampled Farmers of District Mandi

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	13375	13570	13890	13556	13.20	13.61	13.66	13.46
b. Bullock Labour	4700	4500	4650	4606	4.64	4.51	4.57	4.57
c.Seed/Seedlings	8000	7000	8260	7629	7.90	7.02	8.13	7.58
d.Manure	18000	17230	16550	17396	17.77	17.28	16.28	17.28
e.Fertilizer	7570	6945	7275	7250	7.47	6.97	7.16	7.20
f.Insecticides and pesticides	6980	7195	7150	7103	6.89	7.22	7.03	7.05
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	240	260	272	255	0.24	0.26	0.27	0.25
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1759	1693	1733	1726	1.74	1.70	1.70	1.71
k. Miscellaneous expenditure	0	0	0	0	0	0	0	0
Total (Cost A ₁)	60642	58411	59798	59540	59.86	58.58	58.82	59.13
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	60642	58411	59798	59540	59.86	58.58	58.82	59.13
m.Rental value of owned land	26225	26550	26775	26468	25.89	26.63	26.34	26.28
n.Interest on fixed capital (excluding land)	1055	1087	1115	1080	1.04	1.09	1.10	1.07
Cost B (Cost A ₂ +m+n)	87922	86048	87688	87088	86.79	86.30	86.26	86.48
o.Imputed value of family labour	13380	13660	13970	13612	13.21	13.70	13.74	13.52
Cost C (Cost B+o)	101302	99708	101658	100700	100	100	100	100

5.20 Overall cost C was Rs.102187 per hectare in all the sampled farms under study (Table 5.4(c)). The cost C was observed to be lowest in the case of small category in both the areas under study (Tables 5.4(a-b)). In material cost value of manure was the major item accounting for 19.23 percent of the total cost followed by value of seeds/seedlings (7.75%), fertilizer (7.11%) and insecticides and pesticides (7.02%). The proportion of manure used in cauliflower was inversely proportional to the farm size among all the sampled farmers under study. Family labour constituted

12.75 percent of the total cost followed by hired human labour (12.58%) and bullock labour (4.51%). The share of rental value of owned land was about 26 percent of the total cost. Depreciation, land revenue, interest on working and fixed capital accounted for 0.25, 0.02, 1.75 and 1.03 percent of the total cost of cauliflower respectively.

Table 5.4(c). Cost of Cultivation of Cauliflower Among all the Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	12746	13034	12797	12859	1232	12.96	12.51	12.58
b. Bullock Labour	4758	4441	4617	4612	4.60	4.41	4.51	4.51
c.Seed/Seedlings	8262	7128	8458	7916	7.98	7.09	8.27	7.75
d.Manure	20720	19055	18830	19667	20.02	18.94	18.40	19.25
e.Fertilizer	7626	6886	7210	7264	7.37	6.85	7.05	7.11
f.Insecticides and pesticides	7155	7196	7168	7173	6.91	7.15	7.01	7.02
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	242	264	277	259	0.23	0.26	0.27	0.25
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1838	1731	1772	1785	1.78	1.72	1.73	1.75
K. Misc. exp.	0	0	0	0	0	0	0	0
Total (Cost A ₁)	63366	59753	61149	61553	61.23	59.40	59.76	60.24
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	63366	59753	61149	61553	61.23	59.40	59.76	60.24
m.Rental value of owned land	26292	26658	26852	26559	25.41	26.50	26.24	25.99
n.Interest on fixed capital (excluding land)	1027	1059	1074	1050	0.99	1.05	1.05	1.03
Cost B (Cost A ₂ +m+n)	90685	87472	89075	89163	87.64	86.96	87.05	87.25
o.Imputed value of family labour	12795	13121	13257	13024	12.36	13.04	12.95	12.75
Cost C (Cost B+o)	103480	100593	102331	102187	100	100	100	100

Cost of Cultivation of Capsicum

5.21 Capsicum known as 'Shimla mirch' is also an important crop grown in Himachal Pradesh. It is a good source of vitamin C and vitamin A. It is beneficial as a daily health supplement.

5.22 The average cost of cultivation of capsicum in Shimla area is presented in Table 5.5 (a). It can be seen from the table that cost C of the crop capsicum was Rs.84240 per hectare. Category wise, the total cost of capsicum was observed to be Rs.80983, Rs.83503 and 85845 per hectare respectively showing positive relationship with the farm size. Among various cost components of capsicum human labour accounted for 27.42 percent of the total cost. Absolutely as well as proportionately, value of hired human labour increased with the increase in farm size whereas value of family labour is showing an inverse trend. The proportion of value of bullock labour used in this crop was higher in medium farms as compared to other farms. In material cost, value of seed and manure was maximum i.e. 8.74 and 14.50 percent respectively in the case of medium farms whereas value of fertilizer and insecticides & pesticides was maximum i.e. 6.82 and 6.52 percent in case of marginal farms. Combining all the categories, the proportion of seed, manure fertilizer and insecticides & pesticides was worked out to be 6.90, 13.02, 6.82 and 6.52 percent respectively. Rental value of owned land is also the major component of cost C accounted for 30.81 percent. Interest on working and fixed capital constituted 1.56 and 1.29 percent of the total cost of capsicum.

5.23 Expenses incurred on various items in cultivation of capsicum among the sampled farmers of Mandi area are given in Table 5.5 (b). The table shows that the average cost of cultivation of capsicum was Rs.86247 per hectare and was higher in medium farms (Rs.89617/ha.) followed by small and marginal farms i.e. Rs.85791 and Rs.83518 per hectare respectively. In labour cost, the proportion of value of family labour in total cost was observed to be maximum (14.37%) followed by hired human labour (13.56%) and bullock labour (5.21%). Absolutely as well as proportionately, the value of family labour decreased with the increase in farm size whereas the value of bullock labour and hired human labour is showing a direct relationship with the farm size. On an average value of seed/seedlings, manure, fertilizer and insecticides & pesticides were observed to be 7.15, 13.97, 6.62 and

6.45 percent of the total cost respectively. Among the material inputs, the value of manure was the major constituent accounting for 13.97 percent of the total cost of cultivation. The proportion of this cost varied between 14.51 percent in medium farms to 13.17 percent in marginal farms. Proportionately marginal farmers were putting more fertilizer and plant protection material as compared to other categories. Rental value of owned land constituted 29.46 percent of the cost C and interest on working and fixed capital accounted for 1.59 and 1.29 percent of the total cost.

Table 5.5 (a). Cost of Cultivation of Capsicum Among Sampled Farmers of District Shimla

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	10500	11500	12430	11289	12.97	13.77	14.48	13.40
b. Bullock Labour	4200	4440	4800	4454	5.19	5.32	5.59	5.29
c.Seed/Seedlings	5000	6250	7500	5814	6.17	7.48	8.74	6.90
d.Manure	10000	11500	12450	10967	12.35	13.77	14.50	13.02
e.Fertilizer	6000	5400	4500	5749	7.41	6.47	5.24	6.82
f.Insecticides and pesticides	5455	5522	5246	5555	6.74	6.61	6.11	6.59
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. & farm building)	220	208	228	224	0.27	0.25	0.27	0.27
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1235	1338	1408	1315	1.53	1.60	1.64	1.56
K. Misc. exp.	0	0	0	0	0	0	0	0
Total (Cost A ₁)	42628	46176	48580	45387	52.64	55.30	56.59	53.88
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	42628	46176	48580	45387	52.64	55.30	56.59	53.88
m.Rental value of owned land	25320	25240	25650	25955	31.27	30.23	29.88	30.81
n.Interest on fixed capital (excluding land)	1035	1087	1135	1087	1.28	1.30	1.32	1.29
Cost B (Cost A ₂ +m+n)	68983	72503	75365	72429	85.18	86.83	87.79	85.98
o.Imputed value of family labour	12000	11000	10480	11810	14.82	13.17	12.21	14.02
Cost C (Cost B+o)	80983	83503	85845	84240	100	100	100	100

Table 5.5(b). Cost of Cultivation of Capsicum Among Sampled Farmers of District Mandi

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	10595	11690	12580	11693	12.69	13.63	14.04	13.56
b. Bullock Labour	4300	4450	4780	4498	5.15	5.19	5.33	5.21
c.Seed/Seedlings	5250	6050	7200	6166	6.29	7.05	8.03	7.15
d.Manure	11000	12000	13000	12045	13.17	13.99	14.51	13.97
e.Fertilizer	5700	5600	6000	5709	6.82	6.53	6.70	6.62
f.Insecticides and pesticides	5500	5650	5380	5561	6.59	6.59	6.00	6.45
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	248	260	296	266	0.30	0.30	0.33	0.31
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1270	1363	1468	1370	1.52	1.59	1.64	1.59
K. Misc. exp.	0	0	0	0	0	0	0	0
Total (Cost A ₁)	43881	47081	50722	47327	52.54	54.88	56.60	54.87
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	43881	47081	50722	47327	52.54	54.88	56.60	54.87
m.Rental value of owned land	25000	25325	25970	25413	29.93	29.52	28.98	29.46
n.Interest on fixed capital (excluding land)	1087	1115	1145	1117	1.30	1.30	1.28	1.29
Cost B (Cost A ₂ +m+n)	69968	73521	77837	73856	83.78	85.70	86.86	85.63
o.Imputed value of family labour	13550	12270	11780	12391	16.22	14.30	13.14	14.37
Cost C (Cost B+o)	83518	85791	89617	86247	100	100	100	100

5.24 On an average, total cost of cultivation of capsicum was higher (Rs.86247/ha.) in Mandi as compared to Shimla (Rs.84240/ha.). The overall cost in capsicum cultivation was observed to be Rs.84940 per hectare among all the sampled farmers (Table 5.5(c)). On an average, cost C was maximum (Rs.88541/ha.) for medium category followed by small (Rs.85486/ha.) and marginal category (Rs.81905/ha.). The share of material cost (manure 13.66%, seed/seedling 7.07%, fertilizer 6.69% and insecticides/pesticides 6.50%) was 33.92 percent of the total cost. Labour cost was observed to be 33 percent of the total cost. Hired human labour creased with

the increase in the size of holding whereas use of family labour is showing an inverse relationship. The rental value of owned land accounted for about 30 percent of the total cost. The proportions of depreciation, land revenue, interest on working and fixed capital were worked out to be 0.29, 0.02, 1.58 and 1.29 percent of the total cost respectively.

Table 5.5(c). Cost of Cultivation of Capsicum Among all the Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a. Human Labour (Hired)	10535	11665	12537	11473	12.86	13.65	14.16	13.51
b. Bullock Labour	4236	4449	4786	4449	5.17	5.20	5.41	5.24
c. Seed/Seedlings	5091	6077	7286	6005	6.22	7.11	8.23	7.07
d. Manure	10364	11933	12843	11603	12.65	13.96	14.51	13.66
e. Fertilizer	5891	5573	5571	5679	7.19	6.52	6.29	6.69
f. Insecticides and pesticides	5471	5633	5342	5517	6.68	6.59	6.03	6.50
g. Sticks	0	0	0	0	0	0	0	0
h. Depreciation (Imple. and farm building)	230	253	277	250	0.28	0.30	0.31	0.29
i. Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j. Interest on working capital	1248	1359	1451	1342	1.52	1.59	1.64	1.58
K. Misc. exp.	0	0	0	0	0	0	0	0
Total (Cost A ₁)	43084	46960	50111	46336	52.60	54.93	56.60	54.55
l. Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	43084	46960	50111	46336	52.60	54.93	56.60	54.55
m. Rental value of owned land	25204	25314	25879	25397	30.77	29.61	29.23	29.90
n. Interest on fixed capital (excluding land)	1054	1111	1142	1099	1.29	1.30	1.29	1.29
Cost B (Cost A ₂ +m+n)	69341	73385	77132	72832	84.66	85.84	87.11	85.75
o. Imputed value of family labour	12564	12101	11409	12108	15.34	14.16	12.89	14.25
Cost C (Cost B+o)	81905	85486	88541	84940	100	100	100	100

Cost of Cultivation of Beans

5.25 Beans are one of the most important legume pod vegetable grown in Himachal Pradesh. It is a main source of protein, calcium and iron. It is generally grown for their tender pod. The dry seeds are also used for cooking. The average cost of cultivation of beans among the sampled farmers in Shimla is presented in Table 5.6(a).

Table 5.6(a). Cost of Cultivation of Beans Among Sampled Farmers of District Shimla

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	9978	10200	11000	10244	12.13	12.25	13.01	12.35
b. Bullock Labour	4448	4050	3950	4243	5.41	4.86	4.67	5.11
c.Seed/Seedlings	5650	5829	6015	5771	6.87	7.00	7.11	6.95
d.Manure	8380	9550	10542	9125	10.19	11.47	12.47	11.00
e.Fertilizer	5625	5852	5960	5752	6.84	7.03	7.05	6.93
f.Insecticides and pesticides	4850	5000	5250	4971	5.90	6.00	6.21	5.99
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	200	220	232	212	0.24	0.26	0.27	0.26
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1168	1214	1282	1203	1.42	1.46	1.52	1.45
K. Misc. exp.	0	0	0	0	0	0	0	0
Total (Cost A ₁)	40317	41933	44249	41539	49.03	50.35	52.33	50.06
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	40317	41933	44249	41539	49.03	50.35	52.33	50.06
m.Rental value of owned land	26435	26748	26978	26627	32.15	32.12	31.90	32.09
n.Interest on fixed capital (excluding land)	1025	1055	1087	1045	1.25	1.27	1.29	1.26
Cost B (Cost A ₂ +m+n)	67777	69736	72314	69211	82.43	83.74	85.52	83.41
o.Imputed value of family labour	14450	13540	12248	13764	17.57	16.26	14.48	16.59
Cost C (Cost B+o)	82227	83276	84562	82976	100	100	100	100

5.26 It may be seen from the above table that the average cost of cultivation of beans was Rs.82976 per hectare. Cost C of beans in marginal, small and medium category was Rs.82227, Rs.83276 and Rs.84562 per hectare respectively showing increasing trend with the increase in farm size. Expenses incurred on material were 30.87 percent of the cost C (with manure 11% seed/seedlings 6.95%, fertilizer 6.93% and insecticides and pesticides 5.99%). The most important component of the total cost of this crop was the labour cost accounting for 34.05 percent followed by rental value of owned land 32.09 percent of the total cost. The proportion of depreciation, land revenue, interest on working and fixed capital was 0.26, 0.02, 1.45 and 1.26 percent of the total cost of cultivation of beans respectively.

5.27 The costs of cultivation of beans among the sampled farmers of Mandi are given in Table 5.6(b) wherein it can be seen that the average cost of cultivation was Rs.85175 per hectare. The total cost of cultivation of this crop was higher (Rs.87370/ha.) in medium farms and lesser (Rs.83994/ha.) in marginal farms. In total cost, expenses on human labour accounting for 29.12 percent and the farmers of marginal category were observed to be using more family labour. The share of bullock labour in cost C was 4.95 percent. The proportion of material cost was 31.82 percent of the total cost.. The rental value of land was 31.11 percent of the total cost of cultivation of beans. The other components of cost of cultivation of beans were depreciation (0.24%), land revenue (0.02%) interest on working capital (1.49%) and interest on fixed capital (1.24%).

5.28 On an average the total cost of cultivation of beans was higher in Mandi area as compared to Shimla area. Overall, on an average the total cost of cultivation of this crop was Rs.83397 per hectare among all the sampled farmers under study. In material cost the proportion of the value of manure was significantly higher (11.28%) in total costs as compared to the other material costs. The share of family labour in total cost was more (16.54%), followed by hired human labour (12.43%) and bullock labour (5.08%). The rental value of owned land accounted for about 32 percent of the total cost of cultivation of beans. The remaining cost components i.e. depreciation, land revenue, interest on working capital and fixed capital constituted 0.25, 0.02, 1.46 and 1.26 percent of the total cost.

Table 5.6(b). Cost of Cultivation of Beans Among Sampled Farmers of District Mandi

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a. Human Labour (Hired)	10960	10600	11550	10898	13.05	12.51	13.22	12.88
b. Bullock Labour	4250	4150	4330	4214	5.06	4.90	4.96	4.96
c. Seed/Seedlings	5500	5730	5850	5705	6.55	6.76	6.70	6.68
d. Manure	9500	10575	11670	10580	11.31	12.48	13.36	12.40
e. Fertilizer	5475	5680	5850	5672	6.52	6.70	6.70	6.65
f. Insecticides and pesticides	4970	5130	5350	5144	5.92	6.05	6.12	6.03
g. Sticks	0	0	0	0	0	0	0	0
h. Depreciation (Imple. and farm building)	196	216	200	208	0.23	0.25	0.23	0.24
i. Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j. Interest on working capital	1220	1256	1338	1266	1.45	1.48	1.53	1.49
k. Misc. exp. (Machinery, water, elect. Charges etc.)	0	0	0	0	0	0	0	0
Total (Cost A ₁)	42089	43355	46156	43704	50.11	51.16	52.83	51.36
l. Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	42089	43355	46156	43704	50.11	51.16	52.83	51.36
m. Rental value of owned land	26000	26550	26875	26499	30.95	31.33	30.76	31.05
n. Interest on fixed capital (excluding land)	1035	1057	1089	1059	1.23	1.25	1.25	1.24
Cost B (Cost A ₂ +m+n)	69124	70962	74120	71262	82.30	83.73	84.83	83.65
o. Imputed value of family labour	14870	13790	13250	13913	17.70	16.27	15.17	16.35
Cost C (Cost B+o)	83994	84752	87370	85175	100	100	100	100

Table 5.6(c). Cost of Cultivation of Beans Among all the Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	Marginal	Small	Medium	All	Marginal	Small	Medium	All
a.Human Labour (Hired)	10067	10290	11115	10370	12.22	12.31	13.05	12.44
b. Bullock Labour	4430	4073	4029	4238	5.38	4.87	4.73	5.10
c.Seed/Seedlings	5636	5807	5981	5758	6.84	6.94	7.02	6.91
d.Manure	8482	9781	10777	9403	10.30	11.70	12.66	11.20
e.Fertilizer	5611	5813	5937	5737	6.81	6.95	6.97	6.88
f.Insecticides and pesticides	4861	5029	5271	5004	5.90	6.02	6.19	6.00
g.Sticks	0	0	0	0	0	0	0	0
h.Depreciation (Imple. and farm building)	200	219	225	211	0.24	0.26	0.26	0.25
i.Land Revenue and taxes	18	18	18	18	0.02	0.02	0.02	0.02
j.Interest on working capital	1173	1224	1293	1215	1.42	1.46	1.52	1.46
K. Misc. exp.	0	0	0	0	0	0	0	0
Total (Cost A ₁)	40478	42254	44646	41954	49.13	50.54	52.43	50.25
l.Rent paid for leased in land	0	0	0	0	0	0	0	0
Cost A ₂ (Cost A ₁ +l)	40478	42254	44646	41954	49.13	50.54	52.43	50.25
m.Rental value of owned land	26395	26703	26957	26602	32.04	31.94	31.66	31.92
n.Interest on fixed capital (excluding land)	1026	1055	1087	1048	1.25	1.26	1.28	1.26
Cost B (Cost A ₂ +m+n)	67900	70013	72690	69604	82.41	83.74	85.37	83.44
o.Imputed value of family labour	14488	13596	12457	13793	17.59	16.26	14.63	16.56
Cost C (Cost B+o)	82388	83609	85147	83397	100	100	100	100

Input-Output Analysis

5.29 The input-output analysis is important as it gives the idea whether the produce is economically viable or not. In the first part of this section gross as well as net returns from the production of off season vegetables are discussed and in the later input-output ratios are worked out, using gross returns and cost C.

Returns from Cultivation of Vegetable Crops

5.30 Firstly, the gross as well as net returns from the production of selected five off season vegetables on sampled farms of selected areas of H.P. are presented.

Returns from Cultivation of Tomato

5.31 The gross and net returns from tomato are presented in Table 5.7 (a). In Shimla, the overall average gross return realized from the cultivation of tomato was Rs.613500 per hectare and the net return over cost C was Rs.516317 per hectare. The net return over total cost was higher (Rs.529696/ha.) in small farmers as compared to medium farmers (Rs.502939/ha.).

Table 5.7.(a) Input-Output Analysis in Tomato Production

(Rs./hectare)

Particulars	Marginal	Small	Medium	Overall
Shimla				
Cost A ₁	0	58752	58540	58646
Cost A ₂	0	58752	58540	58646
Cost B	0	84754	85811	85283
Cost C	0	97304	97061	97183
Gross returns	0	627000	600000	613500
Net returns over				
Cost A ₁	0	568248	541460	554854
Cost A ₂	0	568248	541460	554854
Cost B	0	542246	514189	528217
Cost C	0	529696	502939	516317
Mandi				
Cost A ₁	56343	60344	0	57343
Cost A ₂	56343	60344	0	57343
Cost B	83598	87184	0	84495
Cost C	95148	99959	0	96351
Gross returns	571875	689063	0	601172
Net returns over				
Cost A ₁	515532	628719	0	543829
Cost A ₂	515532	628719	0	543829
Cost B	488277	601879	0	516677
Cost C	476727	589104	0	504821
Overall				
Cost A ₁	56343	59813	58540	57604
Cost A ₂	56343	59813	58540	57604
Cost B	83598	86354	85811	84652
Cost C	95148	99074	97061	96517
Gross returns	571875	668375	600000	603638
Net returns over				
Cost A ₁	515532	608562	541460	546034
Cost A ₂	515532	608562	541460	546034
Cost B	488277	582021	514189	518986
Cost C	476727	569301	502939	507121

5.32 In Mandi area, the average gross and net returns from tomato cultivation were Rs.601172 and 504821 per hectare respectively. The net return was observed to be significantly high (Rs.589104/ha.) in small category as compared to marginal category (Rs.476727/ha.) due to higher productivity of tomato in this category. The area wise analysis of net returns over total costs shows that the farmers of Shimla area earned slightly more profit in cultivation of tomato as compared to Mandi. On the whole, net returns over cost C and B were Rs.507121 and Rs.518986 per hectare respectively in all the sampled farms under study. Category wise net returns over cost C were observed to be Rs.476727, Rs.569301 and Rs.502939 in marginal, small and medium category. The reason for higher returns in the small category is that the higher productivity of tomato in this category.

Returns from Cultivation of Peas

5.33 The gross and net returns of peas cultivation are presented in Table 5.7 (b). From this table it may be seen that the overall average gross return from the cultivation of peas in Shimla area was Rs.341759 per hectare and category wise these returns were Rs.353395, Rs.350570 and Rs.300000 per hectare in the case of marginal, small and medium category respectively. The net returns over cost C were observed to be Rs.263416, Rs.263896 and Rs.215431 per hectare for marginal, small and medium category respectively and Rs.253809 per hectare as a whole. The net returns were observed to be less in the case of medium category as compared to other categories. In Mandi area, the average gross and net returns from peas cultivation were Rs.428802 and Rs.340780 per hectare respectively. The net return over cost C was observed to be more (Rs.367556/ha.) in the case of marginal category as compared to that of small (Rs.313628/ha.) and medium categories (Rs.333254/ha.). The area wise analysis of net returns over cost C shows that the farmers of Mandi area earned more profit in cultivation of peas due to higher productivity of peas there. On the whole, net returns over cost B and C were Rs.311468 and Rs.299160 per hectare in all the sampled farms under study. Category wise net returns over cost C were observed to be Rs.312392, Rs.294098 and Rs.275776 per hectare in marginal, small and medium categories respectively showing inverse relationship with the size of farm.

Table 5.7(b). Input-Output Analysis in Peas Production

(Rs./hectare)

Particulars	Marginal	Small	Medium	Overall
Shimla				
Cost A ₁	50170	48628	46110	48909
Cost A ₂	50170	48628	46110	48909
Cost B	76431	75434	73169	75485
Cost C	89979	86674	84569	87950
Gross returns	353395	350570	300000	341759
Net returns over				
Cost A ₁	303225	301942	253890	292850
Cost A ₂	303225	301942	253890	292850
Cost B	276964	275136	226831	266274
Cost C	263416	263896	215431	253809
Mandi				
Cost A ₁	49382	48243	46268	48348
Cost A ₂	49382	48243	46268	48348
Cost B	76677	75702	74316	75850
Cost C	89177	87372	86746	88022
Gross returns	456733	401000	420000	428802
Net returns over				
Cost A ₁	407351	352757	373732	380454
Cost A ₂	407351	352757	373732	380454
Cost B	380056	325298	345684	352952
Cost C	367556	313628	333254	340780
Overall				
Cost A ₁	49785	48393	46192	48608
Cost A ₂	49785	48393	46192	48608
Cost B	76551	75598	73767	75681
Cost C	89587	87100	85705	87989
Gross returns	401979	381198	361481	387149
Net returns over				
Cost A ₁	352194	332805	315289	338541
Cost A ₂	352194	332805	315289	338541
Cost B	325428	305600	287714	311468
Cost C	312392	294098	275776	299160

Returns from Cultivation of Cabbage

5.34 The gross and net returns of cabbage cultivation are presented in Table 5.7 (c). The table reveals that the overall average gross return from the cultivation of cabbage, in Shimla area, was Rs.552132 per hectare where as these were Rs.561477, Rs.555000 and Rs.525000 for marginal, small and medium category. The net returns over cost C were observed to be Rs.466354, Rs.462125 and

Table 5.7(c). Input-Output Analysis in Cabbage Production

(Rs./hectare)

Particulars	Marginal	Small	Medium	Overall
Shimla				
Cost A ₁	55552	52530	51561	54257
Cost A ₂	55552	52530	51561	54257
Cost B	82145	79525	78759	81040
Cost C	95123	92875	92087	94144
Gross returns	561477	555000	525000	552132
Net returns over				
Cost A ₁	505925	502470	473439	497875
Cost A ₂	505925	502470	473439	497875
Cost B	479332	475475	446241	471092
Cost C	466354	462125	432913	457988
Mandi				
Cost A ₁	54955	54438	54394	54658
Cost A ₂	54955	54438	54394	54658
Cost B	81215	81020	81461	81223
Cost C	93193	93370	93831	93412
Gross returns	428382	465000	450000	444671
Net returns over				
Cost A ₁	373427	410562	395606	390013
Cost A ₂	373427	410562	395606	390013
Cost B	347167	383980	368539	363448
Cost C	335189	371630	356169	351259
Overall				
Cost A ₁	55292	53929	53135	54440
Cost A ₂	55292	53929	53135	54440
Cost B	81740	80621	80260	81110
Cost C	94282	93238	93056	93730
Gross returns	503462	489000	483333	495417
Net returns over				
Cost A ₁	448170	435071	430198	440977
Cost A ₂	448170	435071	430198	440977
Cost B	421722	408379	403073	414307
Cost C	409180	395762	390277	401687

Rs.432913 per hectare for the marginal, small and medium category showing decreasing trend with the increase in the size of farm. Overall the net return realized by all the sampled farmers, in Shimla district, was Rs.457988 per hectare.

5.35 In Mandi area the average gross and net returns from cabbage cultivation were Rs.444671 and Rs.351259 per hectare respectively. The net return over total cost was observed to be more (Rs.371630/ha.) in medium category as compared to marginal and small category i.e. Rs.335189 and Rs.356169 per hectare respectively. The area wise analysis of net returns over cost C shows that the farmers of Shimla district earned more profit in cultivation of cabbage because of its suitable climate for this vegetable. On an average, net return over cost C was Rs.401687 in all the sampled farms under study.

Returns from Cultivation of Cauliflower

5.36 The gross and net returns realized by the farmers of cauliflower cultivation are presented in Table 5.7 (d). The table shows that in district Shimla on an average net return over cost C was Rs.394539 per hectare with the maximum in small category (Rs.423292/ha.) followed by marginal (Rs.394974/ha.) and medium category (Rs.357332/ha.). In Mandi area the net returns over cost C were observed to be Rs.558800, Rs.542573 and Rs.525217 per hectare for marginal, small and medium category showing inverse relationship with the farm size. On an average net return over cost C realized by the farmers of Mandi area was Rs.545486 per hectare. Area wise net return over cost C was observed to be significantly more in Mandi as compared to Shimla area as the cold climate of Shimla has adverse effect on the productivity of the vegetable whereas the climate of Mandi is suitable for it. Overall, the net returns over cost C were observed to be Rs.430344, Rs.478345 and Rs.413994 per hectare for marginal, small and medium category and Rs.456818 per hectare for all the sampled farmers under study.

Table 5.7(d). Input-Output Analysis in Cauliflower Production

(Rs./hectare)

Particulars	Marginal	Small	Medium	Overall
Shimla				
Cost A ₁	65299	60907	61824	62837
Cost A ₂	65299	60907	61824	62837
Cost B	92646	88692	89768	90498
Cost C	105026	101351	102668	103115
Gross returns	500000	524643	460000	497654
Net returns over				
Cost A ₁	434701	463736	398176	434817
Cost A ₂	434701	463736	398176	434817
Cost B	407354	435951	370232	407156
Cost C	394974	423292	357332	394539
Mandi				
Cost A ₁	60642	58411	59798	59540
Cost A ₂	60642	58411	59798	59540
Cost B	87922	86048	87688	87088
Cost C	101302	99708	101658	100700
Gross returns	660102	642281	626875	646186
Net returns over				
Cost A ₁	599460	583870	567077	586646
Cost A ₂	599460	583870	567077	586646
Cost B	572180	556233	539187	559098
Cost C	558800	542573	525217	545486
Overall				
Cost A ₁	63366	59753	61149	61553
Cost A ₂	63366	59753	61149	61553
Cost B	90685	87472	89075	89163
Cost C	103480	100593	102331	102187
Gross returns	573824	578938	515625	559005
Net returns over				
Cost A ₁	510458	519185	454476	497452
Cost A ₂	510458	519185	454476	497452
Cost B	483139	491466	426550	469842
Cost C	430344	478345	413994	456818

Returns from Cultivation of Capsicum

5.37 The gross and net returns from capsicum cultivation are presented in Table 5.7(e). The overall average gross return from capsicum cultivation was Rs.342750 per hectare in Shimla area. The net returns over total cost (cost C) were Rs.271803, Rs.258872 and Rs.222155 per hectare in marginal, small and medium categories respectively. On the whole net return was Rs.258510 per hectare in Shimla area.

In Mandi area the average gross return was Rs.357987 per hectare. Gross returns among different categories of farmers varied between Rs.344000 per hectare in medium category to Rs.365500 in small category. The net returns over cost C were also more in small category. Category wise net returns over total cost were Rs.267537, Rs.279709 and Rs.259383 per hectare in marginal, small and medium

Table 5.7(e). Input–Output Analysis in Capsicum Production

(Rs./hectare)

Particulars	Marginal	Small	Medium	Overall
Shimla				
Cost A ₁	52628	46176	48580	45387
Cost A ₂	52628	46176	48580	45387
Cost B	68983	72503	75365	72429
Cost C	80983	83503	85845	84240
Gross returns	352786	342375	308000	342750
Net returns over				
Cost A ₁	300158	296199	25940	297363
Cost A ₂	300158	296199	25940	297363
Cost B	283803	269872	232635	270321
Cost C	271803	258872	222155	258510
Mandi				
Cost A ₁	43881	47081	50722	47327
Cost A ₂	43881	47081	50722	47327
Cost B	69968	73521	77837	73856
Cost C	83518	85791	89617	86247
Gross returns	351055	365500	344000	357987
Net returns over				
Cost A ₁	307174	318419	293278	310660
Cost A ₂	307174	318419	293278	310660
Cost B	281087	291979	266163	284131
Cost C	267537	279709	254383	271740
Overall				
Cost A ₁	43084	46960	50111	46336
Cost A ₂	43084	46960	50111	46336
Cost B	69341	73385	77132	72832
Cost C	81905	85486	88541	84940
Gross returns	352435	362780	334286	353570
Net returns over				
Cost A ₁	309351	315820	284175	307234
Cost A ₂	309351	315820	284175	307234
Cost B	283094	289395	257154	280738
Cost C	270530	277294	245745	268630

category of farmers respectively. On the whole, net return over cost C was Rs.271740 per hectare in Mandi area. Area wise comparison between Shimla and Mandi shows that the average cost of cultivation was relatively higher in Mandi area. Overall, the net returns over cost C were observed to be Rs.270530, Rs.277294 and Rs.245745 per hectare for marginal, small and medium category and Rs.268630 per hectare for all the sampled farmers under study.

Returns from Cultivation of Beans

5.38 The gross and net returns from beans cultivation are presented in Table 5.7 (f).

Table 5.7(f). Input-Output Analysis in Beans Production

(Rs./hectare)

Particulars	Marginal	Small	Medium	Overall
Shimla				
Cost A ₁	40317	41933	44249	41539
Cost A ₂	40317	41933	44249	41539
Cost B	67777	69736	72314	69211
Cost C	82227	83276	84562	82976
Gross returns	285066	245000	301414	278057
Net returns over				
Cost A ₁	244749	203067	257165	236518
Cost A ₂	244749	203067	257165	236518
Cost B	217289	175264	229100	208846
Cost C	202839	161724	216852	195081
Mandi				
Cost A ₁	42089	43355	46156	43704
Cost A ₂	42089	43355	46156	43704
Cost B	69124	70962	74120	71262
Cost C	83994	84752	87370	85175
Gross returns	276000	297825	282000	289268
Net returns over				
Cost A ₁	233911	254470	235844	245564
Cost A ₂	233911	254470	235844	245564
Cost B	206876	226863	207880	218006
Cost C	192006	213073	194630	204093
Overall				
Cost A ₁	40478	42254	44646	41872
Cost A ₂	40478	42254	44646	41872
Cost B	67900	70013	72690	69520
Cost C	82388	83609	85147	83322
Gross returns	283423	262599	296853	279618
Net returns over				
Cost A ₁	242945	220345	252207	237746
Cost A ₂	242945	220345	252207	237746
Cost B	215523	192586	224163	210098
Cost C	201035	178990	211706	196296

The overall average gross return realised from the cultivation of beans was Rs.278057 per hectare in Shimla area and these returns ranged between Rs.245000 per hectare in small farmers to Rs.301414 per hectare in medium farmers. The net returns over cost C were observed to be Rs.202839, Rs.161724 and Rs.216852 per hectare in the case of marginal, small and medium categories respectively and Rs.195081 per hectare as a whole. The net returns were more in the case of medium category as compared to other categories.

5.39 In Mandi area the average gross and net returns from beans cultivation were Rs.289268 and Rs.204093 per hectare respectively. The net returns were more (Rs.213073/ha.) in small category followed by medium (Rs.194630/ha.) and marginal category (Rs.192006/ha.).

5.40 On the whole net return over cost C was Rs.196296 per hectare in all the sampled farms under study. Category wise net returns over cost C were Rs.201035, Rs.178990 and Rs.211706 per hectare in marginal, small and medium categories respectively. The area wise analysis of net returns over cost C shows that the farmers of Mandi area earned more profit in cultivation of beans.

Input-Output Ratio

5.41 To examine the production efficiency of various vegetables input output ratio for different size of farms in Shimla and Mandi areas have been worked out and are presented in Table 5.8. It is the ratio of output to inputs used in the production process, i.e. output per unit of input. The figures in the table represent gross returns over cost C for per rupee investment on selected off season vegetables.

5.42 The input-output ratio of tomato production was higher (1:6.31) in the sampled farms of Shimla as compared to Mandi (1:6.24). Overall, the input-output ratio was 1:6.25 for all the sampled farms under study and highest 1:6.75 in the case of small farmers which means small farmers are earning more profit as compared to marginal and medium farmers. In the case of peas production the input-output ratio was more (1:4.87) in Mandi as compared to Shimla (1:3.89), which concludes that the farmers of Mandi area are cultivating peas more efficiently. The overall, input-output ratio was 1:4.40 for all the sampled farms showing that peas cultivation is viable venture in Himachal. As far as the crop cabbage is concerned, the input-output ratio was

higher (1:5.86) in Shimla as against 1:4.76 in Mandi. Overall, input-output ratio was 1:5.29 for all the sampled farmers under study. Category wise these ratios were 1:5.34, 1:5.24 and 1:5.19 for marginal, Small and medium category respectively. In the crop cauliflower the input-output ratio was high in Mandi (1:6.42) in comparison to Shimla (1:4.83). On the whole, on an average input-output ratio was observed to be 1:5.47. The input-output ratio of capsicum production shows that area wise there was not much difference but slightly higher side in Mandi area. Overall, the input-output ratio was 1:4.11 in all the sampled farms under study. Category wise it varied from 1:3.78 in medium farms to 1:4.30 in marginal farms and also showing decreasing trend with the increase in farm size.

Table 5.8. Input-Output Ratio in Various Vegetables Production Among Sampled Farmers

Category	Vegetables					
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans
Shimla						
Marginal	0.00	3.93	5.90	4.76	4.36	3.47
Small	6.44	4.04	5.98	5.18	4.10	2.94
Medium	6.18	3.55	5.70	4.48	3.59	3.56
Total	6.31	3.89	5.86	4.83	4.07	3.35
Mandi						
Marginal	6.01	5.12	4.60	6.52	4.20	3.29
Small	6.89	4.59	4.98	6.44	4.26	3.51
Medium	0.00	4.84	4.80	6.17	3.84	3.23
Total	6.24	4.87	4.76	6.42	4.15	3.40
Overall						
Marginal	6.01	4.49	5.34	5.55	4.30	3.44
Small	6.75	4.38	5.24	5.76	4.24	3.13
Medium	6.18	4.22	5.19	5.04	3.78	3.49
Total	6.25	4.40	5.29	5.47	4.11	3.35

In the case of beans also area wise no significant difference was observed in input-output ratio. Overall category wise the production efficiency was more 1:3.49 in the case of medium farmers followed by marginal farmers (1:3.44) and small farmers (1:3.13). The input-output ratio was 1:3.35 in all the sampled farms under study. In overall, it can be concluded that tomato cultivation was more profitable followed by cauliflower, cabbage, peas, capsicum and beans.

CHAPTER-6

Marketing of Off-Season Vegetables

6.1 Analysis of the costs and returns of any farm produce (vegetables in this study) is very important to assess the profitability/economic viability of the crops, but at the same time it is equally important to analyse how and how much of the produce is utilized and marketed. In this chapter, an attempt has been made to analyse the production and utilization of vegetables produced and markets where marketable surplus was sold including price spread and market margins.

Production and Utilization of Vegetables

6.2 Any vegetable produced by the farmers is retained by them for home consumption, to meet their seed requirement and payment of wages in kind & gift. Also some quantity of produce goes waste in the form of losses. During the production of vegetable crops, insects, pests, diseases, hailing etc. damage the vegetables and reduce the yield. After meeting the above requirements and losses balance of the produce is marketed in different markets. The per farm production of vegetables and the proportion of the produce retained for different purposes by the sampled households under study are given in Tables 6.1(a-f).

Production and Utilization Pattern of Tomato

6.3 Tomato production per farm among the sampled farmers of Mandi was more (85.50 quintals) as compared to Shimla (21.81 quintals) reason being relatively larger area under tomato cultivation in Mandi area. On the whole, on an average the production of tomato per farm was observed to be 53.66 quintals and it was highest (91.50 qtls.) in marginal farms followed by small (35.65 qtls.) and medium farms (32 qtls.) showing negative relationship with the size of holding. The proportionate share of the quantity consumed by the family into total production of tomato was higher (0.69%) in Shimla as compared to Mandi (0.27%). Overall, 0.36 percent was observed to be retained for home consumption. The proportion of losses was higher (6.43%) in Mandi against Shimla (5.42%). The overall proportion of home consumption and losses was 0.36 and 6.23 percent respectively. The

proportion of quantity sold was about 93 percent in all the areas under study (Table 6.1(a)).

Table 6.1. (a) Utilization Pattern of Tomato Among Sampled Farmers

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
Shimla						
Marginal	0	0	0	0	0	0
Small	16.72	0.75	0	0	5.38	93.87
Medium	32.00	0.63	0	0	5.47	93.91
All	21.81	0.69	0	0	5.42	93.89
Mandi						
Marginal	91.50	0.27	0	0	7.10	92.62
Small	73.50	0.27	0	0	4.76	94.97
Medium	0	0	0	0	0	0
All	85.50	0.27	0	0	6.43	93.29
Overall						
Marginal	91.50	0.27	0	0	7.10	92.62
Small	35.65	0.42	0	0	4.96	94.62
Medium	32.00	0.63	0	0	5.47	93.91
All	53.66	0.36	0	0	6.23	93.41

Production and Utilization Pattern of Peas

6.4 The production per farm and the utilization pattern of peas are given in Table 6.1 (b). It can be seen from the table that the average quantity of peas produced was 32.78 quintals per farm in Shimla. The production of peas per farm was observed to be lowest (31.91 qtls.) among the marginal farmers and highest (35.20 qtls.) in medium farmers showing positive relationship with the size of holding. The same trend was observed among in Mandi area, where average production of peas was worked out to be 41.79 quintals per farm. The average production of peas varied between 36.89 quintals (marginal farms) to 57.60 quintals (medium farms). Area wise average production of peas was higher in Mandi as compared to Shimla. On the whole the average production of peas per farm was observed to be 37.36 quintals.

6.5 The utilization pattern of peas shows that the farmers retained green peas for home consumption only, which is on an average 0.84 percent of the total production. The proportion of losses and sold was observed to be 3 and 96 percent of the total production respectively.

Table 6.1.(b) Utilization Pattern of Peas Among Sampled Farmers

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
Shimla						
Marginal	31.91	1.16	0	0	3.23	95.61
Small	33.00	0.89	0	0	2.71	96.40
Medium	35.20	0.60	0	0	2.67	96.73
All	32.78	0.98	0	0	2.98	96.04
Mandi						
Marginal	36.89	0.83	0	0	2.79	96.38
Small	42.73	0.73	0	0	2.78	96.48
Medium	57.60	0.52	0	0	2.41	97.07
All	41.79	0.74	0	0	2.72	96.54
Overall						
Marginal	34.32	0.99	0	0	3.00	96.01
Small	38.63	0.79	0	0	2.76	96.45
Medium	45.16	0.55	0	0	2.52	96.92
All	37.36	0.84	0	0	2.83	96.33

Production and Utilization Pattern of Cabbage

6.6. It can be seen from the table 6.1 (c) that cabbage production per farm among the sampled farmers of Mandi area was higher (81.93 quintals) as compared to Shimla area (77.02 qtls). Whereas category wise in Shimla it was higher (94.11 qtls.) in marginal category and Mandi in medium category (1.20 qtls.). Overall the average production of cabbage per farm was 79.27 quintals. It varied between 65.20 quintals in small farms to 92.80 quintals in medium.

6.7 Over all, utilization pattern of cabbage shows that the proportion of cabbage retained for home consumption was 0.39 percent of the total production with 0.52, 0.29 and 0.16 percent retained by marginal, small and medium categories

respectively having decreasing trend with the increase in the size of holding. The same trend was observed in both the areas under study. Overall, on an average 94 percent of the total produce was sold in the markets.

Table 6.1. (c) Utilization Pattern of Cabbage Among Sampled Farmers
(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
Shimla						
Marginal	94.11	0.52	0	0	4.66	94.81
Small	39.47	0.34	0	0	5.58	94.08
Medium	74.67	0.13	0	0	4.80	95.07
All	77.02	0.41	0	0	4.80	94.78
Mandi						
Marginal	64.73	0.51	0	0	7.85	91.63
Small	90.93	0.27	0	0	5.50	94.23
Medium	120.00	0.19	0	0	5.42	94.40
All	81.93	0.36	0	0	6.49	93.15
Overall						
Marginal	80.55	0.52	0	0	5.85	93.63
Small	65.20	0.29	0	0	5.53	94.18
Medium	92.80	0.16	0	0	5.12	94.72
All	79.27	0.39	0	0	5.60	94.01

Production and Utilization Pattern of Cauliflower

6.8 The production and utilization pattern of cauliflower among the sampled farmers under study is given in Table 6.2(d). The table shows that the average quantity of cauliflower per farm produced was 70.10 quintals in Shimla area. The production of cauliflower per farm varied from 62 quintals (marginal farms) to 80.96 quintals (medium farms). Similarly the production of this vegetable was lowest (85.43 qtls.) in marginal farms and highest (108.17qtls.) in medium farms with an average of 91.85 quintals per farm. This is due to relatively larger area under cauliflower cultivation by the farmers of medium category. Overall, on an average the production of cauliflower was observed to be 79.65 quintals per farm.

6.9 The utilization pattern of cauliflower shows that overall, on an average the quantity of this vegetable consumed in the family was 0.46 percent of the total

produce with a decreasing trend in the categories. The proportion of losses was observed to be 7.85 percent and this proportion was higher (9.81%) in Shimla area as compared to Mandi area (5.95%). Overall, on an average 91.69 percent of the total produce was sold in different markets.

Table 6.1(d). Utilization Pattern of Cauliflower Among Sampled Farmers
(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
Shimla						
Marginal	62.00	0.67	0	0	10.07	89.26
Small	73.45	0.47	0	0	8.66	90.87
Medium	80.96	0.31	0	0	11.05	88.64
All	70.10	0.51	0	0	9.81	89.69
Mandi						
Marginal	85.43	0.51	0	0	6.35	93.14
Small	92.20	1.35	0	0	6.26	93.39
Medium	108.17	0.31	0	0	4.47	95.22
All	91.85	0.41	0	0	5.95	93.65
Overall						
Marginal	72.41	0.59	0	0	8.12	91.29
Small	82.20	0.41	0	0	7.40	92.11
Medium	91.16	0.31	0	0	8.12	91.57
All	79.65	0.46	0	0	7.85	91.69

Production and Utilization Pattern of Capsicum

6.10 The production and utilization pattern of capsicum in Table 6.1(e) shows that average quantity of capsicum per farm produced in Shimla and Mandi area was 22.85 and 32.56 quintals respectively. On the whole, on an average quantity per farm of this vegetable was 28.62 quintals. The production of capsicum per farm varied from 23.68 quintals in marginal category to 33.62 quintals in small category. Out of total production, home consumption, losses and produce marketed were 0.91, 5.45 and 93.64 percent respectively. Area wise the percentage of home consumption and losses was higher in Shimla as compared to Mandi.

**Table 6.1(e). Utilization Pattern of Capsicum Among Sampled Farmers
(Percentages)**

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
Shimla						
Marginal	22.45	1.39	0	0	5.35	93.26
Small	24.90	0.40	0	0	7.23	92.37
Medium	22.40	0.45	0	0	7.81	91.74
All	22.85	1.06	0	0	6.09	92.85
Mandi						
Marginal	26.13	0.86	0	0	4.31	94.83
Small	35.36	0.85	0	0	4.97	94.18
Medium	32.00	0.78	0	0	6.33	92.89
All	32.56	0.84	0	0	5.15	94.01
Overall						
Marginal	23.68	1.20	0	0	4.96	93.84
Small	33.62	0.79	0	0	5.25	93.96
Medium	28.80	0.69	0	0	6.71	92.59
All	28.62	0.91	0	0	5.45	93.64

Production and Utilization Pattern of Beans

6.11 The table 6.1(f) reveals that beans production per farm among the sampled farmers of Shimla area was higher 36.66 quintals comparing to 21.21 quintals in Mandi area. On the whole, on an average the production of beans per farm was 31.98 quintals and it was highest (39.25 qtls.) in marginal category followed by medium category (33.43 qtls.) and small category (18 qtls.). Out of total production, the share of home consumption losses and marketed produce was 0.89, 4.64 and 94.47 percent respectively.

Table 6.1(f). Utilization Pattern of Beans Among Sampled Farmers**(Percentages)**

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
Shimla						
Marginal	46.43	0.80	0	0	2.97	96.23
Small	24.00	1.07	0	0	6.42	92.51
Medium	37.40	0.56	0	0	6.39	93.05
All	36.66	0.81	0	0	4.52	94.68
Mandi						
Marginal	15.33	1.63	0	0	6.09	92.28
Small	23.83	1.09	0	0	5.15	93.76
Medium	23.50	1.06	0	0	4.26	94.68
All	21.21	1.20	0	0	5.15	93.65
Overall						
Marginal	39.25	0.87	0	0	3.26	95.87
Small	18.00	1.08	0	0	5.93	92.99
Medium	33.43	0.66	0	0	5.96	93.38
All	31.98	0.89	0	0	4.64	94.47

6.12 The above analysis shows that in all the vegetables more than 90 percent of the total produce was sold in markets after home consumption and losses. The tendency of retaining vegetables for seed and kind wages or gifts was not observed in the sampled farmers under study.

Losses in Vegetables

6.13 The vegetable crops differ from the other food crops with respect to certain characteristics like moisture content, texture, unit size etc. which makes them highly perishable resulting in losses. The losses start just from the field level due to attack of various insect, pest and diseases, which damage the vegetables and ultimately affects the yield. The producer has also to bear the losses at the time of grading and end-route transportation. The percentages of losses in respect of all six vegetables are given above in Tables 6.2(a-f). Now in next two tables, the extent of losses at various levels viz field, picking/assembling, grading, packing and transportation are evaluated on all the sampled farms.

**Table 6.2(a). Losses in Vegetables up to Market on Sampled Farms
(Qtls./farm)**

Particulars	Farm Size			
	Marginal	Small	Medium	All
Tomato				
-Due to natural calamities	4.75	0.50	0.75	1.96
-.At the time of picking/assembling	1.60	0.83	0.80	1.08
-Grading and packing	0.15	0.43	0.20	0.30
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	6.50	1.77	1.75	3.34
Peas				
-Due to natural calamities	0.64	0.72	0.75	0.68
-.At the time of picking/assembling	0.24	0.26	0.23	0.24
-Grading and packing	0.16	0.08	0.16	0.13
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	1.03	1.07	1.14	1.06
Cabbage				
-Due to natural calamities	2.73	2.33	2.90	2.67
-.At the time of picking/assembling	1.44	0.85	1.45	1.30
-Grading and packing	0.54	0.42	0.40	0.48
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	4.71	3.60	4.75	4.44
Cauliflower				
-Due to natural calamities	3.91	3.38	4.19	3.92
-.At the time of picking/assembling	1.41	1.71	1.84	1.60
-Grading and packing	0.56	0.60	1.38	0.73
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	5.88	6.09	7.41	6.25
Capsicum				
-Due to natural calamities	0.59	1.21	1.28	0.98
-.At the time of picking/assembling	0.38	0.42	0.38	0.39
-Grading and packing	0.21	0.14	0.27	0.19
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	1.18	1.77	1.93	1.56
Beans				
-Due to natural calamities	0.83	0.94	1.21	0.95
-.At the time of picking/assembling	0.33	0.38	0.57	0.40
-Grading and packing	0.12	0.10	0.21	0.13
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	1.28	1.42	1.99	1.49

**Table 6.2(b). Losses in Vegetables up to Market on Sampled Farms
(Percent to total production)**

Particulars	Farm Size			
	Marginal	Small	Medium	All
Tomato				
-Due to natural calamities	5.19	1.40	2.34	3.65
-.At the time of picking/assembling	1.75	2.34	2.50	2.02
-Grading and packing	0.16	1.22	0.63	0.56
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	7.10	4.96	5.47	6.23
Peas				
-Due to natural calamities	1.85	1.87	1.66	1.82
-.At the time of picking/assembling	0.69	0.68	0.50	0.65
-Grading and packing	0.46	0.21	0.36	0.36
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	3.00	2.76	2.52	2.83
Cabbage				
-Due to natural calamities	3.39	3.58	3.13	3.36
-.At the time of picking/assembling	1.79	1.30	1.56	1.64
-Grading and packing	0.67	0.64	0.43	0.60
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	5.85	5.52	5.12	5.60
Cauliflower				
-Due to natural calamities	5.41	4.60	4.59	4.92
-.At the time of picking/assembling	1.95	2.07	2.02	2.01
-Grading and packing	0.76	0.73	1.51	0.92
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	8.12	7.40	8.12	7.85
Capsicum				
-Due to natural calamities	2.50	3.59	4.46	3.41
-.At the time of picking/assembling	1.58	1.24	1.33	1.37
-Grading and packing	0.88	0.42	0.93	0.67
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	4.96	5.25	6.71	5.45
Beans				
-Due to natural calamities	2.11	3.92	3.61	2.98
-.At the time of picking/assembling	0.83	1.59	1.71	1.25
-Grading and packing	0.31	0.42	0.64	0.42
-.Field to road head	0	0	0	0
-.Road head to market	0	0	0	0
-Total losses	3.26	5.93	5.96	4.64

6.14 It can be seen from the tables 6.2(a&b), that in all the vegetables produced by the sampled farmers under study, maximum losses were due to natural calamities followed by losses at the time of picking/assembling and losses at the time of grading and packing. No losses were observed in transportation from field to road head and from road head to market. In vegetables the losses were in the range of 1.06 to 6.25 quintals per farm. Losses due to natural calamities were 3.65, 1.82, 3.36, 4.92, 3.41, 2.98 percent for the tomato, peas, cabbage, cauliflower, capsicum and beans respectively from the respective total production of these vegetables. Losses in picking/assembling were in the range of 0.65 to 2.02 percent. The losses during grading and packing were estimated to be maximum (0.92%) for cauliflower and minimum (0.36%) for peas

Markets for Vegetable Crops

6.15 The quantity of produce actually marketed depends upon the marketable surplus, immediate need for cash, price trend, nature of crops and availability of the storage facilities. The off season vegetables produced by the sampled farmers of the selected areas are supplied to local and nearby markets. It was observed during the field survey that the farmers of Shimla area sold their produce in the local market named Dhali in Shimla and the farmers of Mandi area sold their produce in the local market Karsog. Chandigarh market was the nearby market for both the sampled farmers of Mandi and Shimla and maximum proportion of their produce was observed to be sold in this market. The proportion of different vegetables sold in local and Chandigarh market is given in Tables 6.3 (a-f).

6.16 It can be seen from the Table 6.3 (a) that overall out of the total tomato marketed about 22 percent was sold in local markets and 78 percent is Chandigarh market. In Shimla and Mandi area 80 and 78 percent of the total marketed produce was observed to be sold in the Chandigarh market. Almost same trend was observed in all the categories under study.

**Table 6.3(a). Quantity of Tomato Marketed to Different Markets by
Sampled Farmers**

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market Chandigarh
Shimla				
Marginal	0 (100.0)	0	0	0
Small	15.70 (100.0)	0	3.14 (20.00)	12.56 (80.00)
Medium	30.05 (100.0)	0	6.01 (20.00)	24.04 (80.00)
All	20.48 (100.0)	0	4.09 (20.00)	16.39 (80.00)
Mandi				
Marginal	84.75 (100.0)	0	18.65 (22.00)	66.11 (78.00)
Small	69.80 (100.0)	0	15.37 (22.02)	54.43 (77.98)
Medium	0	0	0	0
All	79.77 (100.0)	0	17.55 (22.01)	62.21 (78.00)
Overall				
Marginal	84.75 (100.0)	0	18.65 (22.00)	66.11 (78.00)
Small	33.73 (100.0)	0	7.21 (21.00)	26.52 (78.61)
Medium	30.05 (100.0)	0	6.01 (20.00)	24.04 (80.00)
All	50.12 (100.0)	0	10.82 (21.59)	39.30 (78.41)

Note. Figures in parentheses denote percentages.

6.17 Table 6.3 (b) reveals that the proportion of peas sold in the local market was higher (23.25%) in Mandi as compared to Shimla (22.53%). Overall, on an average 22.94 and 77.06 percent of the marketed produce was sold in local and Chandigarh markets respectively. The proportion of marketed surplus in Chandigarh market was higher (78%) in medium farmers followed by small farmers (77.36%) and marginal farmers (76.48%) showing positive relationship with the size of holding. The same trend was observed in both the areas under study.

Table 6.3(b). Quantity of Peas Marketed to Different Markets by Sampled Farmers

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market Chandigarh
Shimla				
Marginal	30.51 (100.0)	0	7.02 (23.00)	23.09 (77.00)
Small	31.81 (100.0)	0	7.00 (22.00)	24.81 (78.00)
Medium	34.05 (100.0)	0	7.49 (22.00)	26.56 (78.00)
All	31.48 (100.0)	0	7.09 (22.53)	24.39 (77.47)
Mandi				
Marginal	35.55 (100.0)	0	8.53 (24.00)	27.02 (76.00)
Small	41.22 (100.0)	0	9.48 (23.00)	31.74 (77.00)
Medium	55.91 (100.0)	0	12.3 (21.99)	43.61 (78.01)
All	40.35 (100.0)	0	9.38 (23.25)	30.96 (76.75)
Overall				
Marginal	32.95 (100.0)	0	7.75 (23.52)	25.20 (76.48)
Small	37.26 (100.0)	0	8.44 (22.64)	28.83 (77.36)
Medium	43.77 (100.0)	0	9.63 (22.00)	34.14 (78.00)
All	35.99 (100.0)	0	8.26 (22.94)	27.73 (77.06)

Note. Figures in parentheses denote percentages.

6.18 In the case of Cabbage, It can be seen from the Table 6.3 (c) that about 75 percent of the marketed cabbage was sold in Chandigarh market in all the sampled farmers under study. Remaining 25 percent was sold in the local markets. Almost same trend was observed in the case of Shimla and Mandi area separately.

Table 6.3(c). Quantity of Cabbage Marketed to Different Markets by Sampled Farmers

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market Chandigarh
Shimla				
Marginal	89.23 (100.0)	0	22.30 (24.99)	66.93 (75.01)
Small	37.13 (100.0)	0	8.91 (3.99)	28.22 (76.01)
Medium	70.98 (100.0)	0	17.74 (25.00)	53.24 (75.00)
All	73.00 (100.0)	0	18.16 (24.88)	54.84 (75.12)
Mandi				
Marginal	59.32 (100.0)	0	16.02 (27.00)	43.30 (73.00)
Small	85.68 (100.0)	0	22.28 (26.00)	63.41 (74.00)
Medium	113.27 (100.0)	0	28.31 (24.99)	84.96 (75.01)
All	83.95 (100.0)	0	21.96 (26.15)	62.00 (73.85)
Overall				
Marginal	75.42 (100.0)	0	19.40 (25.72)	56.03 (74.28)
Small	61.41 (100.0)	0	15.59 (25.39)	45.82 (74.61)
Medium	87.90 (100.0)	0	21.97 (25.00)	65.93 (75.00)
All	74.52 (100.0)	0	18.98 (25.47)	55.54 (74.53)

Note. Figures in parentheses denote percentages.

6.19 Table 6.3 (d) reveals that overall, 72.38 percent of the marketable surplus of cauliflower was sold in Chandigarh market and 26.31 percent in local markets. Category wise in both the areas under study, the proportion of marketed cauliflower in local market was highest in marginal category.

**Table 6.3(d). Quantity of Cauliflower Marketed to Different Markets
by Sampled Farmers**

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market Chandigarh
Shimla				
Marginal	55.34 (100.0)	0	15.50 (28.99)	39.85 (72.01)
Small	66.74 (100.0)	0	18.02 (27.00)	48.72 (73.00)
Medium	79.76 (100.0)	0	18.66 (23.39)	53.10 (66.58)
All	64.62 (100.0)	0	17.06 (26.40)	45.82 (73.60)
Mandi				
Marginal	79.56 (100.0)	0	21.48 (27.00)	58.08 (73.00)
Small	86.11 (100.0)	0	22.39 (26.00)	63.72 (74.00)
Medium	103.00 (100.0)	0	25.75 (25.00)	27.25 (75.00)
All	86.01 (100.0)	0	22.55 (26.21)	63.47 (73.79)
Overall				
Marginal	66.11 (100.0)	0	18.16 (27.47)	47.95 (72.54)
Small	75.78 (100.0)	0	20.06 (26.47)	55.72 (73.53)
Medium	88.48 (100.0)	0	21.32 (24.09)	62.16 (70.26)
All	74.01 (100.0)	0	19.47 (26.31)	53.57 (72.38)

Note. Figures in parentheses denote percentages.

6.20 Overall 77 percent of the marketable surplus of capsicum was sold in Chandigarh market and remaining 23 percent in the local markets. Category wise this percentage varied from 76.11 percent in marginal category to 78.30 percent in medium category (Table 6.3(e)).

**Table 6.3(e). Quantity of Capsicum Marketed to Different Markets
by Sampled Farmers**

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market Chandigarh
Shimla				
Marginal	20.93 (100.0)	0	5.23 (24.99)	15.71 (75.01)
Small	23.00 (100.0)	0	4.60 (20.00)	18.40 (80.00)
Medium	20.55 (100.0)	0	4.31 (20.97)	16.24 (79.03)
All	21.22 (100.0)	0	4.97 (23.44)	14.58 (76.56)
Mandi				
Marginal	24.78 (100.0)	0	5.46 (22.02)	19.32 (77.98)
Small	33.30 (100.0)	0	7.31 (21.95)	25.99 (78.05)
Medium	29.73 (100.0)	0	5.83 (22.99)	22.89 (77.01)
All	30.61 (100.0)	0	6.79 (22.18)	3.81 (77.82)
Overall				
Marginal	22.22 (100.0)	0	5.31 (23.89)	16.91 (76.11)
Small	31.58 (100.0)	0	6.86 (21.72)	24.72 (78.28)
Medium	26.67 (100.0)	0	5.99 (22.48)	20.67 (77.52)
All	26.85 (100.0)	0	6.06 (22.58)	20.12 (77.42)

Note. Figures in parentheses denote percentages.

6.21 The quantity of beans marketed to different markets by the sampled farmers is given in Table 6.3(f). Overall, about 76 percent of the marketable surplus of this vegetable was sold in Chandigarh market and 24 percent in local markets. Category wise the proportion of marketed beans in Chandigarh market was maximum (79%) in the case of medium farmers followed by small farmers (75.71%) and marginal farmers (74.35%) showing positive relationship with the size of farms.

Table 6.3(f). Quantity of Beans Marketed to Different Markets by Sampled Farmers

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market Chandigarh
Shimla				
Marginal	44.67 (100.0)	0	11.61 (25.99)	33.06 (74.01)
Small	22.21 (100.0)	0	5.58 (25.12)	16.63 (74.88)
Medium	34.90 (100.0)	0	7.31 (21.00)	27.49 (79.00)
All	34.31 (100.0)	0	8.57 (24.69)	26.14 (75.31)
Mandi				
Marginal	14.15 (100.0)	0	3.11 (21.98)	11.04 (78.02)
Small	22.34 (100.0)	0	5.14 (23.00)	17.20 (77.00)
Medium	22.25 (100.0)	0	4.67 (20.98)	17.58 (79.02)
All	19.87 (100.0)	0	4.44 (22.33)	15.43 (77.67)
Overall				
Marginal	37.63 (100.0)	0	9.65 (25.65)	27.98 (74.35)
Small	22.26 (100.0)	0	5.41 (24.29)	16.85 (75.71)
Medium	31.21 (100.0)	0	6.55 (21.00)	24.66 (79.00)
All	30.21 (100.0)	0	7.32 (24.24)	22.90 (75.76)

Note. Figures in parentheses denote percentages.

6.22 The above analysis (Table 6.3(a-f)) shows that in all the vegetables, out of total marketed produce, 72 to 78 percent was sold in Chandigarh market, making it an important market for the study.

Producers' Share and Marketing Margin

6.23 Marketing is basically the process of movement of goods from producer to consumer at the desired time, place and form. In this process the vegetables has to pass through more than one hand, except when it is directly sold at consumer by the

producer (a rare phenomenon). In this chain various agencies like growers, wholesalers, retailers etc. are engaged. This chain of intermediaries/functionaries is called the marketing channel. Channel through which the various vegetables produced in sampled farms reach the final consumer is the following:

Producer – Wholesaler – Commission Agent/Mashakhori – Retailer – Consumer

6.24 In the marketing of agricultural commodities, the difference between the price paid by consumer and the price received by the producer for an equivalent quantity of farm produce is often known as price spread. Sometimes, this is termed as marketing margins. The total margin includes: the cost involved in moving the product and profit of the various market functionaries involved in moving the produce from the initial point of production till it reaches the ultimate consumer. The difference between the prices received by the growers and price paid by the consumer for vegetables is composed of cost of marketing and rendering market services such as assembling, grading, transporting, wholesaling, retailing the margins of the intermediaries and the market charges, taxes, etc. In order to increase the operational efficiency and minimise the cost and understanding the nature and extent of marketing margins, the study of cost and price spread is essential.

6.25 The Table 6.4 (a) shows the marketing costs and margins for tomato, peas, cabbage, cauliflower, capsicum and French beans sold in Chandigarh wholesale market. It can be seen from this table that the cost of marketing borne by vegetable growers for selling their produce in Chandigarh market worked out to be Rs.285, Rs.411, Rs.270, Rs.288, Rs.278 and Rs.332 per quintal for tomato, peas, cabbage, cauliflower, capsicum and beans respectively. Investment on commission and market fee was the main item of total marketing cost borne by the producer in all the vegetables except cabbage. The second important component of marketing cost was the cost of assembling, grading and packing.

6.26 Producer share in consumer's rupee and proportion of various costs and margins in various vegetables sold at Chandigarh are given in Table 6.4 (b). This table reveals that the share of marketing costs in consumer's rupee was maximum in case of cabbage (11.70%) and minimum in case of peas (8.44%). The share of producer in consumer's rupee was 66.91, 66.82, 66.40, 65.62, 64.46 and 61.35

percent in capsicum, peas, beans, cabbage, cauliflower and tomato respectively. The mashkhor's, margins ranged between 0.97percent to 1.04 percent. The retailer's margin was highest in tomato (9.61%) and lowest in cabbage (8.45%).

Table 6.4(a). Producers' Share and Marketing Margin in Marketing of Vegetables (For Chandigarh Market)

Channel: Producer – Wholesaler – Commission Agent/Mashkhor–Retailer- Consumer

(Rs./Qtls.)

Particulars	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans
1.Net price received by growers	1500	3252	1500	1868	2170	2435
2.Expenses incurred by growers						
i)Assembling, packing and grading	80	100	70	75	65	90
ii)Packing material	6	20	20	20	6	20
iii)Carriage upto road head	20	25	24	22	20	23
iv)Transportation upto market	65	65	65	65	65	65
v)Loading/unloading	10	12	11	10	10	12
vi)Commission & market fee	92	195	68	84	98	110
vii)State tax, octrio etc.	2	2	2	2	2	2
viii) Miscellaneous	10	12	10	10	12	10
Sub-Total	285	411	270	288	278	332
3. Wholesale price	1785	3663	1770	2156	2448	2767
4. Expenses incurred by commission agent/mashkhors						
a)Carriage, handling etc.	50	55	52	53	50	54
b)Market fee & commission	174	358	150	187	239	283
Sub-Total	224	413	202	240	289	337
5.Mashkhor's margin	24	49	24	28	33	38
6. Mashkhors' sale price	2033	4125	1996	2424	2770	3142
7.Retailers' Expenses						
Carriage & handling charges	25	27	26	25	25	26
Retailer losses	152	260	90	187	160	170
Sub-total	177	287	116	212	185	196
8.Retailers' margin	235	455	195	262	288	329
9.Consumers' price	2445	4867	2307	2898	3243	3667

**Table 6.4(b). Producers' Share and Marketing Margin in Marketing of Vegetables
(For Chandigarh Market)**

(Percentage to the total)

Particulars	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans
1.Net price received by growers	61.35	66.82	65.02	64.46	66.91	66.40
2.Expenses incurred by growers						
i)Assembling, packing and grading	3.27	2.05	3.03	2.59	2.00	2.45
ii)Packing material	0.25	0.41	0.87	0.69	0.19	0.55
iii)Carriage upto road head	0.82	0.51	1.04	0.76	0.62	0.63
iv)Transportation upto market	2.66	1.34	2.82	2.24	2.00	1.77
v)Loading/unloading	0.41	0.25	0.48	0.35	0.31	0.33
vi)Commission & market fee	3.76	4.01	2.95	2.90	3.02	3.00
vii)State tax, octrio etc.	0.08	0.04	0.09	0.07	0.06	0.05
viii) Miscellaneous	0.41	0.25	0.43	0.35	0.37	0.27
Sub-Total	11.66	8.44	11.70	9.94	8.57	9.05
3. Wholesale price	73.01	75.26	76.72	74.40	75.49	75.46
4. Expenses incurred by commission agent/mashakhors						
a)Carriage, handling etc.	2.04	1.13	2.25	1.83	1.54	1.47
b)Market fee & commission	7.12	7.36	6.50	6.45	7.37	7.72
Sub-Total	9.16	8.49	8.76	8.28	8.91	9.19
5.Mashakhors' margin	0.98	1.01	1.04	0.97	1.02	1.04
6. Mashakhors' sale price	83.15	84.75	86.52	83.64	85.41	85.68
7.Retailers' Expenses						
- Carriage & handling charges	1.02	0.55	1.13	0.86	0.77	0.71
- Retailer losses	6.22	5.34	3.90	6.45	4.93	4.64
Sub-total	7.24	5.90	5.03	7.32	5.70	5.34
8.Retailers' margin	9.61	9.35	8.45	9.04	8.88	8.97
9.Consumers' price	100	100	100	100	100	100

6.27 From the above discussion, it may be concluded that marketing costs are generally very high which offer scope for improvement. In the present marketing system of vegetables, most of the benefits are reaped by the middlemen. It is suggested that an attempt be made to strengthen the marketing system by organising cooperative societies, particularly for small growers. This will help in minimizing the margin of the intermediaries and will ultimately ensure better producers' share in consumer's rupee.

CHAPTER-7

Off-Season Vegetables in Polyhouses

7.1 Polyhouse farming is an alternative new technique in agriculture gaining popularity in the farmers of Himachal Pradesh. Polyhouse can make small holdings more viable by producing more high value crops like vegetables with the adoption of all weather technology. Polyhouse cultivation can help the farmers to generate income around the year by growing multiple crops and to fetch higher prices for quality off-season vegetables. Polyhouse farming is promoted by the State government by offering subsidies to the farmers. The off-season vegetable cultivation in Himachal is also in practice outside the polyhouses, therefore it becomes important to find out the costs and returns of off-season vegetables inside the polyhouses also. In this chapter an attempt has been made to find out the cost of construction of different categories of sampled polyhouses, costs incurred on cultivation of vegetable crops in polyhouses by different categories of sampled polyhouse farmers, returns from vegetable cultivation in polyhouses and the marketing system of polyhouse crops in two sections.

7.1. Costs and Returns of Off-Season Vegetables in Polyhouse

7.2 This section deals with the costs and returns from cultivation of off season vegetables inside polyhouse. The cost estimates may vary considerably for farmers operating different size of polyhouses. It was found during the field survey that the sampled farmers were growing different vegetable crops in polyhouses, but it was observed that the area devoted to most of these crops was very less and the farmers also did not pay much attention to these crops. Therefore, the present analysis has been carried out only for two important crops, that is, capsicum and tomato grown in three different sizes of polyhouses. These sizes are 250 sq. meters for small, 500 sq. meters for medium and 1000 sq. meters for large category of farmers.

Cost of construction of Polyhouse

7.3 The cost of construction of polyhouse basically depends upon the size and shape of polyhouse structure and type of polyhouse. Recently the polyhouse structure have been made possible on subsidized cost for growing off-season

vegetables and raising nursery successfully in abnormal weather conditions. The Himachal Pradesh government gives 80 percent subsidy to the farmers for the construction of polyhouse and the farmers has to pay only 20 percent of the project cost. The cost of construction of sampled polyhouses of different sizes i.e. 250 sq. meter, 500 sq. meter and 1000 sq. meter is given in Tables 7.1.1(a-c). The construction of polyhouse in the studied area includes the components such as land levelling, planning and drawing the layout, erection of structure, covering the polyhouse by polythene, provision of sunshades and the installation of drip irrigation system.

Cost of Construction of Polyhouse (250m²)

7.4 It can be seen from the table 7.1.1(a) that the total cost of polyhouse construction was Rs.270860 in which Rs.54172 was the net cost paid by the farmers

Table 7.1.1(a). Cost of Construction of Polyhouse (250m²)

(Rs./Polyhouse)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land levelling		9000	1000	10000
Lay out		2500	150000	152500
Erection of structure		2680	20000	22680
Covering by polythene		3000	42360	45360
Provision of sun shades		-	10080	10080
Erection of Trellis		-	-	-
Provision of shelves		-	-	-
Heaters		-	-	-
Coolers		-	-	-
Humidifiers		-	-	-
Drip irrigation system		5000	25080	30080
Drip irrigation		-	-	-
Fogger		-	160	160
Other		-	-	-
Total cost		22180	248680	270860
Amount of subsidy		-	-	216688
Net cost paid by farmer		-	-	54172

and the rest Rs.216688 was the subsidy amount. In total cost, value of hired labour was Rs.22180 (8.19%) and material cost of Rs.248680 (9.81%). The most important component of total cost of construction was drawing the layout of polyhouse accounting for Rs.152500 which is 56.30 percent of the total cost. The other components of total cost were the covering of polyhouses by polythene (Rs.45360), followed by installation of drip irrigation (Rs.30080), erection of structure (Rs.22680) provision of sunshades (Rs.10080) and land levelling (Rs.10000).

Cost of Construction of Polyhouse (500m²)

7.5 The table 7.1.1(b) reveals that the total cost of polyhouse was Rs.517180 in which the net cost paid by the farmer was Rs.103436 and the rest Rs.413744 was

Table 7.1.1(b). Cost of Construction of Polyhouse (500m²)

(Rs./Polyhouse)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land levelling		9000	1000	10000
Lay out		5000	290500	295500
Erection of structure		6000	34320	40320
Covering by polythene		7600	83120	90720
Provision of sun shades		-	20160	20160
Erection of Trellis		-	-	-
Provision of shelves		-	-	-
Heaters		-	-	-
Coolers		-	-	-
Humidifiers			-	-
Drip irrigation system		10500	49730	60230
Drip irrigation		-	-	-
Fogger		-	250	250
Other		-	-	-
Total cost		38100	479080	517180
Amount of subsidy		-	-	413744
Net cost paid by farmer		-	-	103436

the subsidy amount. In total cost the value of hired labour and material costs were Rs.38100 (7.37 %) and Rs.479080 (92.63 %) respectively. The cost of drawing the layout of polyhouse was observed to be Rs.295500 which is 57.14% percent of the total cost, followed by the cost of covering of polyhouses by polythene (Rs.90720), installation of drip irrigation (Rs.60230), erection of structure (Rs.40320), provision of sunshades (Rs.20160) and land levelling (Rs.10000).

Cost of Construction of Polyhouse (1000m²)

7.6 It may be seen from the table 7.1.1(c) that the total cost of a polyhouse was Rs.1003740 in which the net cost paid by the farmer was Rs.200748 and the rest

Table 7.1.1(c). Cost of Construction of Polyhouse (1000m²)

(Rs./Polyhouse)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land levelling		13000	2000	15000
Lay out		12000	568500	580500
Erection of structure		10000	55520	65520
Covering by polythene		13000	168440	181440
Provision of sun shades		-	40320	40320
Erection of Trellis		-	-	-
Provision of shelves		-	-	-
Heaters		-	-	-
Coolers		-	-	-
Humidifiers		-	-	-
Drip irrigation system		12000	108610	120610
Drip irrigation		-	-	-
Fogger		-	350	350
Other		-	-	-
Total cost		60000	943740	1003740
Amount of subsidy		-	-	802992
Net cost paid by farmer		-	-	200748

Rs.802992 was the subsidy amount. In total cost the value of hired labour and material costs were Rs.60000 (5.98%) and Rs.943740 (94.02 %) respectively. In total cost the cost of drawing the layout of polyhouse was observed to be maximum i.e. Rs.580500 (57.83 %) followed by the cost of covering of polyhouse by polythene (Rs.181440, installation of drip irrigation (Rs.120610), erection of structure (Rs.65520), provision of sunshades (Rs.40320) and land levelling (Rs.15000).

7.7 In the selected areas, most of the polyhouses were more than five years old and during the survey, the farmers informed that it was possible to get back the investment on polyhouse within a period of 3 to 5 years. After this period, whatever they earned (Gross return – (production cost + marketing cost)) from the crops/vegetables was their profit.

Cost of Cultivation of Vegetable Crops

7.8 Cost of cultivation of vegetables crops includes various operations and inputs. The labour (family and hired) used for different operations has been evaluated at current market wage rate prevailing in different villages. The input costs have been taken to be the actual cost of inputs and the costs of transportation, carriage, handling etc. if any, have been added to purchase price of inputs to work out the actual cost of inputs applied. The home produced inputs have been evaluated at the current market price for working out the cost of cultivation of selected crops. The cost of cultivation of selected crops namely capsicum and tomato are given in Tables 7.1.2(a-b).

Cost of Cultivation of Capsicum

7.9 The cost of cultivation of capsicum is presented in Table 7.1.2(a). The table reveals that the cost of cultivation, at overall level was Rs.54352 per polyhouse. Category-wise this cost was found to be Rs.17155 for small, Rs.42397 for medium and Rs.91821 for large category. The analysis further reveals that staking of individual plant was the largest cost component accounting for 26 percent of the total cost of cultivation. The second important cost component was the application of manuring/FYM constituting 15 percent of the total cost followed by the cost of harvesting/picking (13%). Fertilizer and insecticides/pesticides application was about 5 percent of the total cost. The cost of seed/seedlings and irrigation together

accounted for about 7 percent of the total cost. The cost of bed formation transplanting the sapling and interculture together was higher than this and was about 19 percent. No farmer was observed to be using vermicompost in this crop. The other details of different categories can also be seen from this table. The analysis also reveals that the cost of different components and the total cost increases with the increase in the size of polyhouse.

Table 7.1.2(a). Cost of Cultivation of Capsicum in Polyhouse

(Rs. /polyhouse)

Cost items	Category				
	Small	Medium	Large	Over all	
				Rs.	%
Formation of beds	1150	2835	5400	3347	6.16
Seed/ seedlings	750	1250	2500	1593	2.93
Transplanting	1125	2430	5690	3323	6.11
Manuring/FYM	3550	8775	11250	8225	15.13
Vermicompost	-	-	-	-	-
Fertilizer	1050	2600	4125	2745	5.05
Insecticides/pesticides	450	1985	5235	2807	5.16
Inter culture	900	2292	6484	3523	6.48
Irrigation	850	1780	3240	2080	3.83
Spraying	425	885	1725	1079	1.99
Stalking etc.	3600	9850	25735	14233	26.19
Harvesting/ picking	1455	4270	14362	7390	13.59
Soil sterilization	1850	3445	6075	4008	7.38
Total	17155	42397	91821	54352	100.00

Cost of Cultivation of Tomato

7.10 The cost of cultivation of tomato is given in table 7.1.2(b). It can be seen from the table that the cost of cultivation of tomato, at overall level was Rs.62543 and category-wise, the cost was Rs.21684 for small, Rs.47592 for medium and Rs.105193 for large polyhouse farmers showing increasing trend with the increase in the size of polyhouse. The analysis also reveals that staking of individual plants

Table 7.1.2(b). Cost of Cultivation of Tomato in Polyhouse

(Rs. /polyhouse)

Cost items	Category				
	Small	Medium	Large	Over all	
				Rs.	%
Formation of beds	1075	2135	4355	2693	4.31
Seed/ seedlings	785	1525	2720	1776	2.84
Transplanting	1243	3564	8125	4670	7.47
Manuring/FYM	2996	4678	6820	5026	8.03
Vermicompost	-	-	-	-	-
Fertilizer	3780	7580	17135	10204	16.31
Insecticides/pesticides	2480	5345	9230	6029	9.64
Inter culture	1050	2335	6330	3520	5.63
Irrigation	825	1795	3295	2099	3.36
Spraying	435	890	1835	1127	1.80
Staking etc.	3620	9975	24980	13984	22.36
Harvesting/ picking	1465	4272	14125	7301	11.67
Soil sterilization	1930	3498	6243	4114	6.58
Total	21684	47592	105193	62543	100.0

was the largest cost component accounting for 22 percent of the total cost followed by the cost of fertilizer (16%) and harvesting/picking (12%). Insecticides/pesticides and manuring/FYM application was about 10 and 8 percent of the total cost respectively. The cost of bed formation accounted for 4 percent and transplanting the sapling was higher than this, i.e.7 percent. The cost of seed/seedlings and irrigation accounted for about 3 percent each. The costs incurred on soil sterilization and interculture were about 7 and 6 percent respectively. The cost on spraying was about 2 percent of the total cost.

Net Returns From Cultivation of Vegetable Crops

7.11 The net returns have been calculated by adding the marketing cost to the total cost of production and then subtracting it from the value of output. The net returns from capsicum and tomato cultivation are given in Tables 7.1.3(a-b).

Net Returns from Cultivation of Capsicum

7.12 The net returns from capsicum cultivation are presented in Table 7.1.3(a) wherein it can be seen that at overall level, average net returns from cultivation of capsicum was Rs.149686 per polyhouse, whereas category net returns were Rs.69205, Rs.117623 for and Rs.235839 for small, medium and large polyhouse farmers respectively.

Table 7.1.3(a). Net Returns From Cultivation of Capsicum in Polyhouse

(Rs. /polyhouse)

Cost items	Category			
	Small	Medium	Large	Over all
Production cost	17155	42397	91821	54352
Marketing cost	11322	20979	42957	26750
Total cost	28477	63376	134778	81102
Gross Returns	97682	180999	370619	230789
Net returns	69205	117623	235839	149686

Net Returns From Cultivation of Tomato

7.13 The net returns from tomato cultivation for different size categories of polyhouse farmers are presented in Table 7.1.3(b). The analysis reveals that total cost of tomato cultivation was Rs.40884, Rs.85352, Rs.175992 and Rs. 107806 for small, medium, large and for all polyhouse farmers respectively. It was found that at overall level, average net returns from cultivation of tomato was Rs.227142 per polyhouse. However, the net returns were Rs.101196, Rs.194072 and Rs.347928 for small, medium and large polyhouses farmers respectively.

Table 7.1.3(b). Net Returns From Cultivation of Tomato in Polyhouse

(Rs. /polyhouse)

Cost items	Category			
	Small	Medium	Large	Over all
Production cost	21684	47592	105193	62543
Marketing cost	19200	37760	70800	45263
Total cost	40884	85352	175992	107806
Gross Returns	142080	279424	523920	334948
Net returns	101196	194072	347928	227142

Net Returns per box From Vegetable Cultivation

The net returns per box from selected vegetables are given in Table 7.1.4(a-b).

Net Returns per box From Capsicum Cultivation

7.14 The net returns per box of capsicum are presented in Table 7.1.4(a). It can be seen from this table that on an average total production was 402 boxes per polyhouse in a year. The cost per box was Rs.194 and its value in the market was Rs.574 resulting in net returns of Rs.260 per box at overall level. The net returns per box were Rs.407 for small, Rs.373 for medium and Rs.365 for large polyhouse farmers. The input-output ratio (gross returns/production cost, Table 7.1.3(a)) were

1:4.25 at overall level and 1:5.69, 1:4.27 and 1:4.04 for small, medium and large polyhouse farmers respectively.

Table 7.1.4(a). Net Returns per box and Input-Output Ratio From Cultivation of Capsicum in Polyhouse

(Rs. /box of 20 Kgs)

Cost items	Category			
	Small	Medium	Large	Over all
Total production (boxes, per polyhouse in a year)	170	315	645	402
Cost per box	167	201	209	194
Value per box	574	574	574	574
Returns per box	407	373	365	260
Input output ratio	1:5.69	1:4.27	1:4.04	1:4.25

Net Returns per box From Tomato Cultivation

7.15 The net returns per box of tomato are presented in Table 7.1.4(b). The table reveals that on an average total production was 566 boxes per polyhouse in a year. The cost per box was Rs.185 and its value in market was Rs.592 resulting in net return of Rs.407 per box at overall level. The net returns per box were Rs.422 for small, Rs.411 for medium and Rs.393 for large polyhouse farmers. The input-output ratio (gross returns/production cost, Table 7.1.3(b)) were 1:6.55, 1:5.87, 1:4.98 and 1:5.35 for small, medium, large and overall polyhouse farmers respectively.

**Table 7.1.4(b). Net Returns per box and Input-Output Ratio From Cultivation
of Tomato in Polyhouse**

(Rs. /box of 25 Kgs)

Cost items	Category			
	Small	Medium	Large	Over all
Total production (boxes, per polyhouse in a year)	240	472	885	566
Cost per box	170	181	199	185
Value per box	592	592	592	592
Returns per box	422	411	393	407
Input output ratio	1:6.55	1:5.87	1:4.98	1:5.35

7.2. Marketing System of Polyhouse Vegetable Crops

In this section an attempt has been made to analyse the production and utilization of selected vegetables produced in polyhouses, marketing pattern and marketing costs etc.

Production and Utilization of Capsicum and Tomato

7.16 The production and utilization pattern of capsicum and tomato in sampled area has been presented in Table 7.2.1(a). The analysis reveals that out of the total production of 402 boxes (per polyhouse in a year) of capsicum at overall level only 1.93 percent were the losses at different stages. Family consumption and gifts accounted for 0.73 and 0.48 percent of the total production respectively. In case of tomato, the total production per polyhouse in a year was 566 boxes out of which 1.36 percent were losses. Only 0.68 percent boxes were consumed by the farming family and 0.34 percent given as gifts.

**Table 7.2.1. Production and Utilization of Vegetable Crops in
Sampled Polyhouses**

Category	Production (Boxes, per polyhouse in a year)	(% of total production)			
		Losses	Retained for		
			Family	Gifts	Wages
Capsicum (Box of 20 Kgs.)					
Small	170	3.53	1.18	0.59	-
Medium	315	2.54	0.95	0.63	-
Large	645	1.40	0.62	0.31	-
Overall	402	2.00	0.75	0.50	-
Tomato (Box of 25 Kgs.)					
Small	240	2.92	0.83	0.42	-
Medium	472	1.91	0.85	0.42	-
Large	885	1.13	0.56	0.23	-
Overall	566	1.41	0.71	0.35	-

Marketing Pattern of Capsicum and Tomato

7.17 The main destinations for the vegetable produce inside the polyhouses by the selected farmers under study were local markets and the Chandigarh market. Table

Table 7.2.2. Marketing Pattern of Polyhouse Crops on Sampled Farms

(Qty. in boxes; Rate in Rs.)

Category	Sold at							
	Chandigarh		Neighbouring States		Local markets		Total	
	Qty	Rate/box	Qty	Rate/box	Qty	Rate/box	Qty	Rate/box
Capsicum								
Small	146	592	-	-	15	399	161	574
Medium	262	599	-	-	40	412	302	574
Large	560	593	-	-	70	422	630	574
Overall	345	595	-	-	44	412	389	574
Tomato								
Small	200	625	-	-	30	375	230	592
Medium	395	624	-	-	62	387	457	592
Large	798	609	-	-	70	400	868	592
Overall	496	618	-	-	56	389	551	592

7.2.2 presents the details of the markets. The analysis reveals that at overall level, out of total marketed surplus of 389 boxes of capsicum, 345 boxes i.e. 88.69 percent were marketed in Chandigarh market and rest 44 boxes i.e. 11.31 percent in the local markets. In the case of tomato, out of total marketed produce of 552 boxes, 496 boxes i.e. 90 percent were marketed in Chandigarh market and rest 56 boxes i.e. 10 percent in the local market.

Marketing Costs of Capsicum and Tomato in Chandigarh Market

7.18 The marketing costs incurred by producer for marketing capsicum and tomato in Chandigarh market are presented in Table 7.2.3. On an average, marketing cost per quintal in case of capsicum, incurred by producer was Rs.333. The breakup of marketing costs incurred by the capsicum producers reveal that commission of

Table 7.2.3. Marketing Costs of Capsicum & Tomato in Chandigarh Market

(Rs./Qtl.)

Particulars	Capsicum	Tomato
Gross returns received by grower	2873	2370
Growers' expenses on		
Picking, packing, grading and assembling	65	80
Packing material	6	6
Transportation		
(i.) Carriage up to road head	17	18
(ii).Freight up to market	73	73
(iii). Loading/unloading charges	10	10
Commission of C.A. and market fee	152	123
Other charges	10	10
Total expenses paid by the grower	333	320

commission agent and transportation constituted major share in total cost of producers. Commission of commission agent was Rs.152 per quintal followed by the expenses on transportation Rs.100 per quintal and picking, packing at Rs.65 per quintal. On an average in case of tomato commission of commission agent was Rs.123 per quintal. Grower's expenses on transportation, picking, packing and packing material were Rs.101, Rs.80 and Rs.6 per quintal respectively.

7.19 It can be concluded from the above analysis that overall in polyhouse cultivation, the input output ratio was 1: 5.35 and 1:4.25 in case of tomato and capsicum respectively making the venture profitable as most of the farmers have already recovered the cost of construction of polyhouse. In the case of cultivation of off season vegetables outside polyhouse, the input output ratio was observed to be 1:6.25 and 1:4.11 for tomato and capsicum respectively. The cultivation of off season vegetables is beneficial both inside and outside polyhouse, but the cultivation inside polyhouse is certainly beneficial to the growers of those areas where this is not possible outside polyhouse.

CHAPTER-8

Problems Faced by Vegetable Growers

8.1 In this chapter, an attempt has been made to study the problems of vegetable growers in two sections. First section deals with the problems in growing vegetables inside polyhouse and the second section with the problems in growing vegetables outside polyhouse.

8.1. Problems in Growing Off-Season Vegetables Inside Polyhouse

8.2 Although the polyhouse farming was found to be profitable, the activity is not free from problems. The farmers are facing many problems related to polyhouse construction, inputs, cropping practices, harvesting and marketing of polyhouse crops. Majority of farmers faced more than one problem in all the aspects and hence, analysis of multiple responses has been used for this purpose.

Problems Faced in Adoption and Construction of Polyhouse

8.3 The polyhouse growers of the selected areas were asked about the problems they faced related to construction schedule information, technology transfer,

Table 8.1.1. Problems Faced in Adoption and Construction of Polyhouse

(Multiple Responses in %)

Type of Problem	Category			Overall
	Small	Medium	Large	
Information not provided clearly	31.03	37.50	17.95	28.00
Cumbersome clearance from department	48.27	53.12	48.71	50.00
Delays in technology transfer	41.37	56.25	51.28	50.00
Long wait for loan clearance/subsidy	51.72	40.62	35.89	42.00
Construction materials not locally available	34.46	53.13	48.71	46.00
Contractor delayed the execution	55.17	46.87	51.28	51.00
High construction cost	34.48	43.75	53.85	45.00
Unavailability of skilled labour	37.93	46.87	43.58	43.00

loans/subsidy clearance, construction material etc. Most of the respondents stated that the execution was delayed by the contractor. Fifty percent complained about the clearance procedure adopted by various departments, which in their opinion was long and cumbersome. Delays in technology transfer was the another problems stated by 50 percent of the respondents. Forty two percent stated that there was a long wait involved in getting clearance of loan and subsidy from the departments and 28 percent were of the view that the information was not provided clearly to them regarding adoption and construction of polyhouse.

Problems Faced in Input Availability

8.2 Various problems like unavailability, higher prices and low quality of inputs were faced by the growers. Sixty percent complained the problem of higher prices of inputs required for crop production in a polyhouse. About fifty percent reported unavailability of inputs and 58 percent told that the inputs were of poor quality.

Table 8.1.2. Problems Faced in Input Availability

(Multiple Responses in %)

Type of problem	Category			Overall
	Small	Medium	Large	
Unavailability	48.27	50.00	48.72	49.00
Higher prices	62.06	62.50	56.41	60.00
Low quality	55.17	65.62	53.84	58.00

Problems Faced in Cropping Practices

8.3 The cropping practices of crop production are significantly different in polyhouses than that of in growing crops or vegetables outside the polyhouse. Polyhouse farming requires skill monitoring and care. The main problem stated by the respondents was the cultural practices i.e. raising nursery and crops etc., eighty one percent had little information about these practices. Sowing time was another major problem and 72 percent farmers revealed that they had little idea about the most appropriate sowing time. About 33 percent farmers said that they have no

knowledge about the proper time to irrigate the vegetables grown in polyhouse and also of sowing and irrigation intensity.

Table 8.1.3. Problems Faced in Cropping Practices

(Multiple Responses in %)

Type of problem	Category			Overall
	Small	Medium	Large	
Sowing time	82.75	90.62	48.71	72.00
Sowing Intensity	24.14	46.87	12.82	27.00
Cultural practices	68.96	84.37	87.17	81.00
Time and intensity of irrigation	27.58	50.00	15.38	30.00

Problems Faced in Harvesting and Marketing

8.4 The polyhouse growers also faced the problems related to harvesting, packing/processing, storage, marketing etc. In the harvesting of crops the main problems were the time and method of harvesting. About 30 percent growers faced problems in deciding time & methods of harvesting and about the storage of the

Table 8.1.4. Problems Faced in Harvesting, Storage, Packing and Marketing

(Multiple Responses in%)

Type of problem	Category			Overall
	Small	Medium	Large	
Harvesting	-	-	-	-
Time	24.13	50.00	15.38	29.00
Method	24.13	53.12	21.87	31.00
Storage	20.68	56.25	21.87	31.00
Packing/Processing	82.76	93.37	84.62	87.00
Marketing	89.65	87.50	100.0	93.00

produce each. Most of the respondents (93%) faced the problems of marketing followed by the problems of packing/processing (87%). The farmers do not have a proper nearby market to sell their produce.

8.5 Besides the problems mentioned above, the farmers also reported that polyhouses are prone to damage by heavy rain and storms. Such farmers in the region suffered losses and they found difficult to reconstruct these due to lack of funds.

8.2. Problems in Growing Off-Season Vegetables Outside ,Polyhouse

8.6 Profit from growing of vegetables depends upon many factors like care taken in grading & packing, transportation, storage, marketing etc. In this section, the problems related to these activities faced by sampled farmers growing off season vegetables outside polyhouse are discussed.

Problems in Availability of Transport

8.7 The problems of the growers regarding transportation are given in Table 8.2.1. About 67 percent of the respondents stated that vehicles were not available in time, they had to wait for their turn or they had to pay more for quick disposal. Eighty three

Table 8.2.1. Problems in Availability of Transport Faced by Sampled Farmers

(Multiple response %)

Particulars	Not available in time	Higher charges	Any other	No problem
Shimla				
Marginal	70.59	88.23	-	-
Small	75.00	87.50	-	-
Medium	40.00	60.00	-	-
All	66.67	83.33	-	-
Mandi				
Marginal	66.67	86.67	-	-
Small	63.64	72.73	-	-
Medium	75.00	100.0	-	-
All	66.67	83.33	-	-
Overall				
Marginal	68.75	87.50	-	-
Small	68.42	78.95	-	-
Medium	55.56	77.78	-	-
All	66.67	83.33	-	-

percent growers complained about higher transportation charges at the peak season of vegetables. The situation was reported to be the same in both the study areas i.e. Shimla and Mandi.

Problems of Packing Material

8.8 The packing material such as plastic crates, paper are used in the case of tomato and capsicum and gunny bags in cabbage, peas, beans and cauliflower. Various problems like shortage of packing material, high prices of these, non-availability in time were faced by the growers and are given in Table 8.2.2. Forty three percent of the sampled vegetable growers reported the problem of shortage of packing material. About 53 percent complained of high prices of packing material and 27 percent were of the opinion that the packing material was not available in time. About twelve percent reported no problem in this regard. The table further reveals that all the above said problems were almost same in both the study areas.

Table 8.2.2. Problems of Packing Material Faced by Sampled Farmers

(Multiple response %)

Particulars	Shortage	High price	Not available in time	No problem
Shimla				
Marginal	47.06	58.82	29.41	11.76
Small	37.50	50.00	37.50	12.50
Medium	40.00	40.00	20.00	20.00
All	43.33	53.33	30.00	13.33
Mandi				
Marginal	40.00	46.67	26.67	13.33
Small	36.36	45.45	18.18	9.09
Medium	75.00	100.0	25.00	-
All	43.33	53.33	23.33	100.0
Overall				
Marginal	43.75	53.12	28.12	12.50
Small	36.84	47.37	26.32	10.53
Medium	55.56	66.67	22.22	11.11
All	43.33	53.33	26.67	11.67

Storage Problems

8.9 The main problem regarding storage of produce is either the growers have no storage facility or if they have some, that is inappropriate as well as inadequate as is given in Table 8.2.3. Over all, majority of the farmers (87%) reported that they have no storage facility and about 23 percent of the growers stated that they have storage facilities but inadequate. No farmer in Mandi area had storage facility.

Table 8.2.3. Problems of Storage Facility Faced by Sampled Farmers

(Multiple response %)

Particulars	No storage facility available	Inadequate storage facility	No problem
Shimla			
Marginal	70.59	41.18	-
Small	87.50	50.00	-
Medium	60.00	60.00	-
All	73.33	46.67	-
Mandi			
Marginal	100.0	-	-
Small	100.0	-	-
Medium	100.0	-	-
All	100.0	-	-
Overall			
Marginal	84.37	80.87	-
Small	94.74	21.05	-
Medium	77.78	33.33	-
All	86.67	23.33	-

Problems of Market Intelligence

8.10 Market intelligence plays an important role in the marketing of perishables. The prices of produce depend mainly on the market conditions, and if the growers do not have proper information regarding market, then he cannot take the advantage of high prices. The problems concerning market intelligence have been classified as late information, information available for few markets, inadequate information and misleading information as given in Table 8.2.4. Of all the sampled vegetable growers, 48 percent reported that they received late information regarding prices at various markets for their vegetables. Forty five percent of the farmers were of the opinion that they do get market information, but for a few markets. These two problems were more in Mandi as compared to Shimla. About 37 and 32 percent of

the total sample reported that they get inadequate and misleading information respectively.

Table 8.2.4. Problems of Market Intelligence Faced by Sampled Farmers

(Multiple response %)

Particulars	Late information	Available for few markets	Inadequate information	Misleading information	No problem
Shimla					
Marginal	41.18	29.41	35.29	23.53	-
Small	37.50	50.00	27.50	25.00	-
Medium	60.00	60.00	40.00	60.00	-
All	43.33	40.00	36.67	30.00	-
Mandi					
Marginal	53.33	46.67	40.00	26.67	-
Small	54.55	45.45	27.27	27.27	-
Medium	50.00	75.00	50.00	75.00	-
All	53.33	50.00	36.67	33.33	-
Overall					
Marginal	46.87	37.50	37.50	25.00	-
Small	47.37	47.37	31.58	26.32	-
Medium	55.56	66.67	44.44	67.67	-
All	48.33	45.00	36.67	31.67	-

Problems of Malpractices

8.11 Sometimes vegetable growers get very little out of their sale because of low prices in the market, high marketing cost, malpractices by commission agents and other market functionaries etc. Thirty eight percent of the growers stated that commission agents deduct more charges. This problem was observed more in Shimla as compared to Mandi. Thirty percent farmers reported that payment was unduly delayed and 35 percent told that payments often paid in instalments. Forty percent reported multiplicity of charges and 38 percent were of the view that the commission agents also deducted undue charges. According to the majority of the farmers (75%), commission agents quote lower prices than the actual one (Table 8.2.5).

Table 8.2.5. Problems of Malpractices in Market Faced by Sampled Farmers

(Multiple response %)

Particulars	Deduct more charges	Part payment	Late payment	Multiplicity of charges	Undue deductions	Quote less prices than actual prices	No problem
Shimla							
Marginal	41.17	29.41	17.65	35.29	23.53	64.70	-
Small	37.50	25.00	50.00	37.50	37.50	75.00	-
Medium	60.00	60.00	40.00	40.00	60.00	100.0	-
All	43.33	33.33	30.00	36.67	33.33	73.33	-
Mandi							
Marginal	33.33	20.00	26.67	33.33	20.00	80.00	-
Small	27.27	45.45	36.36	54.44	63.63	72.73	-
Medium	50.00	75.00	26.00	50.00	75.00	75.00	-
All	33.33	36.67	30.00	43.33	43.33	76.67	-
Overall							
Marginal	37.50	25.00	21.87	34.37	21.87	71.88	-
Small	31.58	36.84	42.11	47.37	52.63	73.68	-
Medium	55.55	66.67	33.33	44.44	66.67	88.89	-
All	38.33	35.00	30.00	40.00	38.33	75.00	-

CHAPTER-9

Conclusions and Policy Implications

9.1 To conduct the study on off season vegetables in the state of Himachal Pradesh, six vegetables viz. tomato, capsicum, beans, peas, cabbage and cauliflower were selected for cultivation outside polyhouse and two vegetables viz. tomato and capsicum were selected for cultivation inside polyhouse. Two districts namely, Shimla and Mandi were selected for collecting data on cultivation outside polyhouse on the basis of highest area under these vegetables whereas for studying the costs, and returns of off season vegetables inside polyhouses, the information/data is taken from the study “An Economic Analysis of Protected Cultivation Under MIDH in Himachal Pradesh” assigned by the Ministry of Agriculture and Farmers Welfare, GOI to this centre for the same period.

Main Findings

9.2 The total area under various vegetables grown in the State during the year 2014-15 was 73894 hectares. The highest area was under peas (31.97%) followed by tomato (14.61%) cauliflower (7.02%), cabbage (6.52%), beans (5.09%) and capsicum (3.26%). During the period 2005-06 to 2014-15, year to year growth in vegetables varied from 0.10 to 8.74 percent with the highest percentage growth in the year 2009-10. The total production of various vegetables in the State during the year 2014-15 was 1576454 MT. The largest production was of tomato (30.19%) followed by peas (17.61%), cabbage (10.04%), cauliflower (7.44%), capsicum (3.50%) and beans (2.99%). During the period 2005-06 to 2014-15, year to year growth in the production of vegetables varied from 3.05 to 10.63 percent. In the State during 2014-15, productivity of tomato, peas, cabbage, cauliflower, capsicum and beans was 441, 118, 328, 225, 229 and 126 qtls./ha. respectively.

9.3 On an average, total cost (cost C) of cultivation of tomato, peas, cabbage, cauliflower, capsicum and beans (off season vegetables grown outside polyhouse) were Rs.96517, Rs.87989, Rs.93730, Rs.102187, Rs.84940 and Rs.83397 per hectare in all the sampled farms. Per hectare cost of cultivation of cauliflower was highest in all the vegetables and among all the categories this was highest

(103480qtls/ha.) on marginal farms in all the sampled farms. Same was the case with vegetable having lowest cost; that is, per hectare cost of cultivation of beans was lowest in all the vegetables and among all the categories this was also lowest (82388qtls/ha.) on marginal farms in all the sampled farms. In case of tomato cost C was highest in case of small category and in case of capsicum in medium category whereas in case of cabbage it was highest in marginal category. Thus category wise no specific trend appeared in the costs of these vegetables.

9.4 The material cost was the most important component of the total cost C in all the vegetables with 41.13, 37.44, 36.66, 33.92, 32.53 and 31 percent in cauliflower, tomato, cabbage, capsicum, peas and beans respectively in all the sampled farms. The labour cost (family & hired) and rental value of owned land were another two major cost components ranging from 25 to 30 percent each in all vegetables. The other components of cost of cultivation of vegetables were depreciation land revenue, interest on working capital and interest on fixed capital accounted for about 3 percent of cost C.

9.5 The average net return over cost C realized from the cultivation of tomato, peas, cabbage, cauliflower, capsicum and beans were Rs.507121, Rs.299160, Rs.401687, Rs.456818, Rs.268630, and Rs.196296 per hectare respectively in all the sampled farms under study. As observed above, per hectare cost of cauliflower was highest whereas return in case of tomato was highest making it more profitable. The input-output ratio of tomato production was also highest (1:6.25) among all the vegetables in all the sampled farms under study. In the case of peas, cabbage, cauliflower, capsicum and beans on an average input-output ratio was 1:4.40, 1:5.29, 1:5.47, 1:4.11 and 1:3.35 in all the sampled farms under study. After tomato, cauliflower cultivation was most profitable followed by cabbage, peas, capsicum and beans.

9.6 In all the sampled farmers, there was no tendency of retaining vegetables for seed and kind wages or gifts and more than 90 percent of the total produce was sold in markets after home consumption and losses. Out of total marketed produce, 72 to 78 percent was sold in Chandigarh market, making it an important market for the study.

9.7 The channel through which the various vegetables produced in sampled farms reach the final consumer was **Producer–Wholesale –Commission Agent/Mashakhor–**

Retailer–Consumer. The cost of marketing borne by vegetable growers for selling their produce in Chandigarh market worked out to be Rs.285, Rs.411, Rs.270, Rs.288, Rs.278 and Rs.332 per quintal for tomato, peas, cabbage, cauliflower, capsicum and beans respectively. Investment on commission and market fee was the main item of total marketing cost borne by the producer in all the vegetables except cabbage. The second important component of marketing cost was the cost of assembling, grading and packing.

9.8 The share of marketing costs in consumer's rupee was maximum in case of cabbage (11.70%) and minimum in case of peas (8.44%). The share of producer in consumer's rupee was 66.91, 66.82, 66.40, 65.62, 64.46 and 61.35 percent in capsicum, peas, beans, cabbage, cauliflower and tomato respectively. The mashkhor's, margins ranged between 0.97percent to 1.04 percent. The retailer's margin was highest in tomato (9.61%) and lowest in cabbage (8.45%).

9.9 The various problems faced by the vegetable growers (growing vegetables outside polyhouse) related to transportation facilities were; non availability of vehicles in time, long wait to get vehicles or payment of more charges during the peak season of vegetables. Besides transportation, problems like shortage of packing material, high prices of these and lack of storage facilities were also faced by the grower in the study areas. The prices of produce depend mainly on the market conditions, and if the growers do not have proper information regarding market, then they cannot take the advantage of high prices. The farmers were facing the problems of getting late information, information available for few markets, inadequate information and misleading information. Sometimes vegetable growers get very little out of their sale because of low prices in the market, high marketing cost, malpractices by commission agents and other market functionaries etc. In most of the cases, commission agents quote lower prices than the actual one.

9.10 Two important crops, that is, capsicum and tomato grown in three different sizes, of polyhouses; namely, small, medium and large (up to 250, 500 and 1000sq. meters) were studied. The total cost of construction of a polyhouse of different sizes, i.e. small, medium and large was Rs.270860, Rs.517180 and Rs.1003740 respectively in which Rs.54172, Rs.103436 and Rs.200748 was the net cost paid

by the farmers and the rest was the subsidy amount. In the selected areas, most of the polyhouses were more than five years old.

9.11 The cost of cultivation of capsicum at overall level was Rs.54352 per polyhouse. Category-wise this cost was found to be Rs.17155 for small, Rs.42397 for medium and Rs.91821 for large category. In the case of tomato, the cost of cultivation was Rs.62543 in all the polyhouse farms and category-wise, the cost was Rs.21684 for small, Rs.47592 for medium and Rs.105193 for large polyhouse farmers. The staking of individual plant was the largest cost component accounting for 26 percent in capsicum and 22 percent in tomato. The other important cost components were the application of manuring/FYM, fertilizer, insecticides/pesticides and cost of harvesting/picking. No farmer was observed to be using vermicompost in this crop.

9.12 On an average, the net return from capsicum cultivation was Rs.149686 per polyhouse, whereas category wise net returns were Rs.69205, Rs.117623 for and Rs.235839 for small, medium and large polyhouse farmers respectively. In the case of tomato cultivation, net returns were Rs.101196, Rs.194072 and Rs.347928 for small, medium and large polyhouses farmers respectively. At overall level, net return from cultivation of tomato was Rs.227142 per polyhouse.

9.13 On an average, the total production of capsicum and tomato was 402 and 566 boxes per polyhouse in a year having cost per box Rs.194 and Rs.185 respectively. Out of total marketed surplus of 389 boxes of capsicum, 345 boxes i.e. 88.69 percent were marketed in Chandigarh market and rest 44 boxes i.e. 11.31 percent in the local markets. In the case of tomato, out of total marketed produce of 552 boxes, 496 boxes i.e. 90 percent were marketed in Chandigarh market and rest 56 boxes i.e. 10 percent in the local market. Their value in the market was Rs.574 and Rs.592 per box resulting in net returns of Rs.260 and Rs.407 per box. The input-output ratios were 1:4.25 and 1:5.35 for capsicum and tomato respectively.

9.14 On an average, marketing cost per quintal in case of capsicum, incurred by producer was Rs.333. The commission of commission agent and transportation constituted major share in total cost of producers. Commission of commission agent was Rs.152 per quintal followed by the expenses on transportation Rs.100 per quintal and picking, packing at Rs.65 per quintal. On an average in case of tomato

commission of commission agent was Rs.123 per quintal. Grower's expenses on transportation, picking, packing and packing material were Rs.101, Rs.80 and Rs.6 per quintal respectively.

9.15 Although the polyhouse farming was found to be profitable regarding income and employment generation, the activity is not free from problems. In most of the cases execution of the polyhouse was delayed due to the long and cumbersome clearance procedure adopted by various departments for sanctioning polyhouse and clearance of loan & subsidy. The construction was further delayed by the contractor. Delay in technology transfer was another reason due to which the polyhouses could not become operational well in time. Once a polyhouse became operational, unavailability of inputs, higher prices or poor quality of inputs were the problems faced by farmers. Lack of knowledge of most appropriate sowing time and cultural practices i.e. raising nursery and crops etc. was another major problem. The polyhouse growers also faced the problems related to harvesting, packing/processing, storage, marketing etc.

9.16 It can be concluded that overall in polyhouse cultivation, the input output ratio was 1: 5.35 and 1:4.25 in case of tomato and capsicum respectively making the venture profitable as most of the farmers have already recovered the cost of construction of polyhouse. In the case of cultivation of off season vegetables outside polyhouse, the input output ratio was observed to be 1:6.25 and 1:4.11 for tomato and capsicum respectively. The cultivation of off season vegetables is beneficial both inside and outside polyhouse, but the cultivation inside polyhouse is certainly beneficial to the growers of those areas where this is not possible outside polyhouse.

Policy Implications

9.17 It is clear from the above that growing off season vegetables outside and inside polyhouse in Himachal Pradesh has improved the quality of life of the growers by improving income and employment. However, the profitability of these crops still can be improved by taking the following steps.

- Establishment of vegetable processing units in producing areas can improve the profitability by reducing the losses in picking, grading and

packing etc. This will also solve the problem of packing material and transportation up to some extent.

- Research efforts should be made to increase the range of products (from tomato sauce and cauliflower pickle) that could be prepared from hill vegetables.
- Keeping in view the perishable nature of vegetables and variations in market prices, adequate storage facilities should be developed.
- Arrangements should be made to provide latest information regarding prices and arrivals of the vegetables in the markets.
- The emphasis should be given to expand the market and develop infrastructure by improving packing and transportation facilities.
- In the present marketing system of vegetables, most of the benefits are reaped by the middlemen. An attempt should be made to strengthen the marketing system by organising cooperative societies, particularly for small growers. This will help in minimizing the margin of the intermediaries and will ultimately ensure better producers' share in consumer's rupee.
- The cropping practices of crop production are significantly different in polyhouses than that of in growing crops or vegetables outside the polyhouse. Polyhouse farming requires skill monitoring and care. Before polyhouses become operational, the growers should be given proper training related to cultural practices i.e. raising nursery and crops, intensity of irrigation, the most appropriate sowing and harvesting time.
- The polyhouses in H.P. were prone to damage by heavy rain and storms. Such farmers found difficult to reconstruct these polyhouses due to lack of funds. Polyhouses should be insured at the time of construction.

References

- ANI News “Polyhouse Boost Vegetable Cultivation in Kashmir”,
The Hindu, March, 14, 2014.
- ANI News “Off-Seasonal Vegetable Production Takes Off in Himachal Pradesh”,
available on www.business-standard.com/
- Baba, Sajad Hassan and Mann, Amitoj Singh. (2005), “Resource use Efficiency of Main and Off-Season Vegetables under Irrigated Condition of Himachal Pradesh”, *Indian Journal of Agricultural Economics*, 60(3): 533-534.
- Baba S.H., Wani, M.H., Wani, S.A. and Shahid Yousuf (2010), “Marketed Surplus and Price Spread of Vegetables in Kashmir Valley”, *Agricultural Economics Research Review*, 23:115-127.
- Bala, Brij; Sharma Nikhil, and Sharma, R.K. (2011), “Cost and Return Structure for the Promising Enterprise of Off-Season Vegetables in Himachal Pradesh”, *Agricultural Economics Research Review*, 24(1): 141-148.
- Choudhary, A.K. (2016), “Scaling up of Protected Cultivation in Himachal Pradesh, India”, *Current Science*, Vol. 3, No.2, 272-277.
- Economic Survey of Himachal Pradesh, 2015-16, Directorate of Economics and Statistics, Govt. of Himachal Pradesh.
- Kouser Parveen Wani, Singh, P., Amin, A. Mushtaq, F. and Dhar, Z. A (2011), “Protected Cultivation of Tomato, Capsicum and Cucumber Under Kashmir Valley Condition”, *Asian Journal of Science and Technology*, Vol. 1, Issue, 4, 56-61.
- Mishra S., Singh, Rakesh and Singh, O.P. (2014), Economic Analysis of Marketing of Major Vegetables in Varanasi District of Uttar Pradesh, India. *Economic Affairs*, 59(4):649-652.
- Polyhouse Farming – Profits and Advantages (2015), Article Available on <http://www.agrifarming.in/polyhouse-farming-profits/>
- Priscilla L. and S. P. Singh. (2015). Economics of Vegetable Production in Manipur. *Indian Journal of Economics and Development*, 11(4):933-938
- Sanwal, S.K., Patel, K.K. and Yadav, D.S. (2004), “Vegetable Production Under Protected Conditions in NEH Region: Problems and Prospects”, *Envis Bulletin*, Vol.12, No.2, 9-15.

- Sharma, Meenakshi and Singh, R. (2008), "Post Harvest Losses in Fruits and Vegetables in Himachal Pradesh", *Indian Journal of Agricultural Marketing*, Vol.22, No.1, 13-24.
- Singh, B.; A., Roy, Anju Choudhury, Singh, N.U. and Singh S.P. (2015), "Production and Marketing of Vegetables in Manipur" Some Policy Issues. *Annals of Horticulture*, 8 (1): 38-45
- Singh, D.V.(1990), "Production and Marketing of Off-Season Vegetables", *Mittal Publications*, New Delhi.
- Singh, Ranveer, Sharma, Tulsi Raman and Sharma, Kavita (1994) "Production and Marketing of Hill Vegetables – A Study of Himachal Pradesh", *Agricultural Marketing*, July-Sept.:23-27.
- Singh, Ranveer and Sikka, B.K.(1989), "Hill Vegetables- A Study of Production and Marketing in Himachal Pradesh", *Agro-Economic Research Centre, H.P. University, Shimla(Mimeo)*.
- Singh, Ranveer and Sikka, B.K. (1992), "Marketing of High Value Perishable Crops in Himachal Pradesh", *Agro-Economic Research Centre, H.P. University, Shimla(Mimeo)*
- Singh, Ranveer, Vaidya, C.S. and Karol, Anshuman (2006), "Likely Demand of Vegetables of Himachal Pradesh in the Neighbouring consuming States During Next Ten Years", *Agro-Economic Research Centre, H.P. University, Shimla (Mimeo)*.
- Singh, Ranveer, Vaidya, C.S. (2005), "Production, Marketing, Storage and Transportation Losses of Selected Vegetables in Shimla and Solan Districts", *Agro-Economic Research Centre, H.P. University, Shimla (Mimeo)*.
- Singh, Ranveer, Vaidya, C.S. Meenakshi and Singh Pratap (2011), "Impact of Emergin Marketing channels in Agriculture, Marketing-Benefit to Producer-Sellers and Marketing Costs and Margins of Apple and tomato in Himachal Pradesh", *Agro-Economic Research Centre, H.P. University, Shimla (Mimeo)*.
- Singh Shiv Pratap (2012), "Off-season tomato production in North Western Himalayas under changing climate paper published in Vegetable Production Under Changing Climate Scenario, Department of Vegetable Science, Dr. Y.S. Parmar University of Horticulture and forestry, Nauni, Solan, H.P.,101-103..*
- Thakur, D.S., Sanjay, Thakur, D.R. and Sharma, K.D.(1994), "Economics of Off-Season Vegetable Production and Marketing in Hills", *Indian Journal of Agricultural Marketing*, Vol.8, No.1-72-82.

- Tuteja,U. and Subhash Chandra. (2014), "Impact of Emerging Marketing Channel on Stakeholders: An Anlysis of Horticultural crops in Haryana Asia"
Pacific Journal of Rural Development,24(1):67-81.
- Vaidya, C.S. and Singh Ranveer (2011), "Production and Marketing of Flowers and Vegetables Under Protected Cultivation in Himachal Pradesh",
Agro-Economic Research Centre, H.P. University, Shimla (Mimeo).
- Verma,L.R. (2004), "Marketing of Fruits and Vegetables in Himachal Pradesh Strategies for Sustainable Development", *Indian Journal of Agriculatural Marketing*", Vol. 18, No.3, 202-226.

Reviewer comments

1. Title of the draft report examined:

Economic Analysis of Cost and Return of Off-Season Vegetables with Focus on Poly House Effect in Himachal Pradesh

2. Date of assignment receipt to the reviewer: 20.02. 2017

3. Date of dispatch of the comments: March 14, 2017

4. Comments on the objectives of the study:

All the objectives of the study are met.

5. Comments on methodology, analysis, organization, presentation etc. :

The study has been undertaken as per the stated objectives and methodology.

However, followings are suggested for necessary insertion to add value to the report.

- i. As the focus of the study is on “poly house effect” the number of sample with poly house and without poly house may perhaps be indicated in Chapter II along with percentage terms.
- ii. In chapter III, Table-3.1 & Table- 3.2, may also display absolute figures on area and production, together with State total. Table-3.3 may indicate the state average productivity as well against the vegetable crops under reference. Trend equation can be fitted for the data presented in Table 3.4 & Table 3.5. Additionally, the compound annual growth rate (CAGR) can be worked out for area and production.
- iii. The percentage of outstanding amount (Table-4.13) against the loan availed by the sample beneficiaries may be indicated in Chapter IV.
- iv. The figure in table Table-5.1(a) (16/74) may be corrected. To intercept the effect of poly house, comparative analysis of two situations (with poly house and without poly house) in terms of separate tables may be indicated, subject to availability of adequate data base.
Also, input output ratio should not have any unit like “Rupees” which may be corrected throughout the report (In Executive Summary as well as in Chapter V at pages 65 & 66).
- v. The Chapter VI & VII could have been combined to draw a conclusion on poly house effect of off season vegetables with poly house and without poly house.
- vi. Proper editing of the manuscript may be done to avoid mistakes, typographical or otherwise.

6. Overall view on the acceptability of the report:

The report may be accepted after incorporation of necessary modifications as suggested.

Action Taken Report

- 1. Date of receipt of comments:** 14.03. 2017.
- 2. Date of dispatch of final report:** March 27, 2017.
- 3. Action taken on methodology, analysis, organization, presentation etc. :**
 - i. The number of sampled farmers without polyhouse and with polyhouse are given in Chapter II (Tables 2.2&2.3) along with percentage terms.
 - ii. In chapter III, Table-3.1 & Table- 3.2, the absolute figures on area and production, of vegetables of State total are given now in last row and last column, the rest can be computed from these.
 - iii. In Table-3.3, the state average productivity of vegetables on the sampled farms is also included. Trend equations are fitted for the data presented in Table 3.4 & Table 3.5. The compound annual growth rate (CAGR) are also worked out for area and production.
 - iv. The percentage of outstanding amount (Table-4.13) against the loan availed by the sample beneficiaries are included in Chapter IV.
 - v. The figure in table Table-5.1(a) (16/74) is corrected as 16.74. To intercept the effect of poly house, comparative analysis of two situations (with poly house and without poly house) in terms of separate tables is not possible, as there are 6 vegetables grown outside polyhouse and only 2 vegetables grown inside polyhouse. However, a comparison has been made in Para 7.19.
 - vi. In input output ratio, the unit “Rupees” has been removed.
 - vii. The Chapters VI & VII cannot be combined as the figures per polyhouse and per hectare cannot be compared.
 - viii. The editing of the manuscript has been done.