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ECONOMIC ANALYSIS OF COST AND RETURN OF OFF SEASON VEGETABLES WITH FOCUS ON POLYHOUSE EFFECT

(Consolidated Report)

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Background

The present study “Economic Analysis of Cost and Return of Off-Season Vegetables with Focus on Poly house Effect” was undertaken by three Agro –Economic Research Centres namely, Shimla, Delhi and Santiniketan with the guide lines of Directorate of Economics and Statistics, Ministry of Agriculture and Farmers welfare, Government of India during the year 2015-16. The Agro –Economic Research Centre, Shimla was the coordinator of the studies conducted in the States of Himachal Pradesh, J&K by AERC, Shimla, in Uttarakhand by AERC, Delhi and in Sikkim by AERC, Santiniketan. The studies were consolidated by AERC, Shimla with the assistance of AERC, Santiniketan.

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 urbanization 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 hilly terrain of Jammu and Kashmir in the north is endowed with a variety of rich climate and topographical conditions. In hilly areas of J&K, knolkhol, peas, tomato, beans, radish etc. are mainly grown in various belts throughout the year as off season vegetables. Off season vegetables are the valuable cash crops of Jammu and Kashmir and are cultivated by the growers in their crop field as well as in polyhouses. Raising of vegetable nursery in polyhouses is very popular in J&K. Generally in Kashmir region, in polyhouses only seedlings are raised and by planting the seedling in the field, the yield is taken in advance than the normal method of direct sowing.

For the hilly state of Uttarakhand, cultivation of vegetables constitutes an important part of agricultural activity undertaken with about 22.65 per cent of the area under production being

devoted to vegetables. Since the climatic conditions of the hilly states are not suitable for production of conventional crops, diversification in terms of the vegetables offers enormous opportunity for the cultivators in the state. In that respect off-season vegetable crops have huge potential. In fact, the agro-climatic condition of the hills is conducive in the production of vegetables such as tomato, cauliflower, cabbage, vegetable pea, cucumber, French beans, capsicum etc. in different zones in the hills. Farmers also have higher incentive to grow off-season vegetables since they get higher value from producing these vegetables during summer and rainy season. Moreover, with the availability of new technology, it has become much easier for them to overcome the seasonal barriers associated with hill farming making farming more remunerative for them.

Horticultural sector, especially cultivation of off season vegetables in Sikkim is getting prominence for over the periods. . In Sikkim, specially designed low cost greenhouses have become very popular. Across the entire state such low cost greenhouses are found in abundance which is being utilized for cultivation of tomato, capsicum, cabbage, cauliflower and various kinds of flowers and many other crops.

However for marketing of vegetables, Indian farmers have traditionally depended heavily on middlemen since major marketing costs are incurred on transport, loading/ unloading etc. Marketing of vegetable crops is quite complex owing to short shelf-life, high seasonality in production and bulkiness. Moreover, the efficiency of vegetables marketing in India has been of significant concern in recent years; on the one hand is high and fluctuating consumer prices and on the other hand producer end up getting only a small share of the consumer rupee.

Objectives

The main objectives of the study were 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 were 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.

Methodology

To conduct the study on off season vegetables in the state of Himachal Pradesh, Uttarakhand, Jammu & Kashmir and Sikkim a multistage stratified random sampling technique was used in the selection of the districts, blocks, villages and finally of the vegetable growers. 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 in HP, Uttarakhand and Sikkim. In Jammu & Kashmir five vegetables viz. tomato, capsicum, Knolkhol, cabbage and cauliflower were selected for cultivation outside polyhouse. A total sample of 120 vegetable growers of different categories, growing vegetables outside polyhouse, was selected from the States under the study. In case of Himachal Pradesh, J&K and Sikkim, for studying the costs, and returns of off season vegetables inside polyhouses, the information/data was taken from the study "An Economic Analysis of Protected Cultivation Under MIDH" assigned by the Ministry of Agriculture and farmers welfare, GOI. Whereas, in case of Uttarakhand, the data was collected seperately.

Analytical tools used: 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. 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) were also calculated by using the following formula:

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.

Main Findings

Age Occupation and Literacy of the Head

In Himachal Pradesh 36.97, 38.09 and 29.24 percent were males, females and children. In Jammu-Kashmir 32.45, 35.31, and 32.24 percent were males, females, and children, whereas in Uttarakhand these percentages were 42.81, 39.06, and 18.13 percent respectively. In Sikkim there were 41.30, 40.42 and 18.28 percent of males, females and children among sampled households. The proportion of children was more in Jammu-Kashmir in comparison to Himachal Pradesh, Utrakhand and Sikkim. The sex ratio among the sampled households in Himachal Pradesh, Jammu-Kashmir, Uttarakhand and Sikkim has been come out 1030, 1088, 912 and 978 females over 1000 males respectively.

Average family size was higher in Uttarakhand (9.63 persons) followed by Jammu & Kashmir (8.12 persons), Sikkim (4.74 persons) and Himachal Pradesh (4.73 persons

Social Classification

In Himachal Pradesh most of the sampled households (85%) fall in general category and few households belong to scheduled caste (8.33%) and other backward castes (6.67%). In Jammu-Kashmir all sampled households (100%) fall in general category, whereas in Uttarakhand 12.30, 47.54 and 40.16 percent of the sampled farmers belongs to scheduled caste, schedule tribe and general category. Further in Sikkim 23.33, 43.33, 23.33 and 10.00 percent of the sampled farmers belong to scheduled caste, schedule tribe, OBC and general category respectively.

Farm Size and Utilization Pattern

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 in Himachal Pradesh, Jammu-Kashmir, Utrakhand and Sikkim was observed to be 1.16, 0.22, 0.64 and 1.10 hectares.

Source of Water for Irrigation

The main source of water for irrigation in Himachal Pradesh, and Jammu & Kashmir was kuhl whereas in Uttarakhand and Sikkim it was tap water, streams and other sources.

Source of Drinking Water

The main source of drinking water in Himachal Pradesh, Jammu & Kashmir and Sikkim was tap water and in Uttarakhand it was from other sources.

Cropping Pattern

In Himachal Pradesh 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 maize and wheat crops were most popular in the state. In Jammu & Kashmir the percentage area under maize and paddy crops has been worked out as 50 per cent each. In Uttarakhand wheat is main crop (23.06 per cent) followed by other crops (19.78%), fruits (18.79%), potato (12.48%), maize (8.93%), paddy (7.42%) and barley (1.88%) respectively. **I**n Sikkim potato is the main crop (48.50%) followed by paddy (46.02%) and maize (5.49%).

Cropping Intensity

Cropping intensity (with fruits) was higher in Himachal Pradesh as compared to Jammu-Kashmir, Uttarakhand and Sikkim. The cropping intensity (without fruits) has been worked out 200, 200, 120 and 139 among the sampled farmers of Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim.

Area under Off-Season Vegetables

In Himachal Pradesh, the area under peas was highest (38.62%), followed by cauliflower (23.02%), cabbage (19.17%), beans (18.28 %) capsicum (5.51%) and tomato (1.67%). Among all the sampled farmers in Jammu & Kashmir, the area under cabbage was maximum (37.77%) followed by cauliflower (37.44%), knolkhol (12.97%) tomato (6.24%) and capsicum (5.58%). While in Uttarakhand the area under peas was maximum (35.63%) followed by tomato (21.88%), cabbage (19.89%), cauliflower (13.18%), capsicum (5.13%) and beans (4.28%) respectively. In Sikkim the area under cabbage was maximum (22.89%) followed by cauliflower (21.53%), peas (15.52%), beans (15.17%) tomato (12.92%) and capsicum (11.97%) respectively.

Productivity of Off-Season Vegetables

In Himachal Pradesh the area wise average productivity of off season vegetables shows that tomato shares the 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.). In Jammu & Kashmir area wise average productivity of tomato was maximum (280 qtls./ha.) followed by cabbage (260 qtls./ha.), knolkhol (260 qtls./ha.), cauliflower (256 qtls./ha.) and capsicum (245 qtls./ha.), whereas in Uttarakhand the area wise average productivity of cabbage was highest (215 qtls./ha.) followed by tomato (211 qtls./ha.), cauliflower (193 qtls./ha.), capsicum (184 qtls./ha.), beans (115 qtls./ha.) and peas (91 qtls./ha.) respectively. In Sikkim the area wise average productivity of capsicum was maximum (496.05 qtls./ha.) followed by tomato (298.85 qtls./ha.), cabbage (240.68 qtls./ha.), cauliflower (234.00 qtls./ha.), beans (133.85 qtls./ha.) and peas (124.00 qtls./ha.) respectively.

Production Efficiency

In Himachal Pradesh tomato cultivation was more profitable followed by cauliflower, cabbage, peas, capsicum and beans. In Jammu & Kashmir capsicum cultivation was more profitable followed by knolkhol, cauliflower, tomato and cabbage. While in Uttarakhand cultivation of capsicum was more profitable followed by cauliflower, beans, tomato, peas and cabbage. In Sikkim cultivation of peas was also more profitable followed by beans, cabbage, tomato, cabbage and capsicum.

Marketing of Off-Season Vegetables

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 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 8.45percent.

The cost of marketing borne by vegetable growers for selling their produce in Jammu market worked out to be Rs.368, Rs.332, Rs. 360, Rs.349 and Rs.353 per quintal for tomato, cabbage, cauliflower, capsicum and knolkhol. Transportation cost was the main component of total marketing cost borne by the producer in all the vegetables marketing due to their distant location. The second important component of marketing cost was the cost of commission and market fee. The share of marketing costs in consumer's rupee was maximum in case of cabbage (14.08%) and minimum in capsicum (10.45%). The share of producer in consumer's rupee was 65.89, 65.83, 63.65, 63.61 and 61.22 percent in capsicum, knolkhol, cauliflower, cabbage and tomato respectively. The mashakhor's margins ranged between 0.83 percent in tomato to 0.99 percent each in capsicum and knolkhol. The retailer's margin was highest in tomato (9.47%) and lowest in cabbage 7.97percent.

In Uttarakhand all the vegetables are being sold entirely in one or more of the three major markets of the district itself, namely Joshimath, Gopeshwar and Karna Prayag, which are located at a distance of roughly 60- 80 kms from the polyhouses covered under the study.

In Sikkim about 71.1 per cent of capsicum production and 62.2 percent of tomato production is sold to the consumers through FPOs, while about 28.9 per cent and 37.8 per cent of capsicum and tomato is marketed in nearby markets respectively. In the absence of any market fee or commission in the local markets or organic vegetable kiosks, the costs on account of marketing in nearby markets together account for 7.7 per cent and 7.83 per cent respective for capsicum and tomato.

Problems

The farmers growing vegetables inside polyhouse have encountered some of the problems as: delayed or lack of information, cumbersome clearance process, unavailability of construction material at the local level, delay in technology transfer, lack of skilled labour, high construction cost. Low quality and high prices of inputs are reported as two major problems by these farmers. Sowing time and irrigation intensity are some other problems they encountered with respect to cropping practices. All the growers reported that they had problem with the time and method of such farming as well as marketing them. For the without polyhouse vegetables growers, transportation of their produce is a big issue and so are packing and storage. Inadequate storage facility or inadequacy or non- availability of packing material at the time of need are some of the common problems reported by them. Late and partial or misleading information regarding marketing causes detrimental to these farmers. Last but not the least, the

problem of malpractice plagued the system as has been reported by the sampled growers. Many of them complained about late payment, part payment, overcharging, undue deductions, and quotation of less than actual prices in the market.

Policy Implications

It is clear from the above that growing off season vegetables outside and inside polyhouse in Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim has improved the quality of life of the growers by increasing income and employment. However, the profitability of these crops still can be increased 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 are 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.
- The polyhouse growers should be provided quality seeds in time and at the reasonable rates so that the productivity of off season vegetables can be increased by using the seedling raised in polyhouses. Farmers should be encouraged to establish high tech polyhouses as such polyhouses can produce good quality saplings before their expected time.
- Like Sikkim formation of Farmer Producers' Organizations should be encouraged so that the hurdles in post-harvest management and marketing are reduced to the minimum for the marginal and small vegetable producers. Under active state supervision, marketing through FPOs/SHGs can reduce middlemen's commission and keep off other market intermediaries. As members participants, the farmers can themselves act as retailers in government regulated markets and organic kiosks.

CHAPTER–1

Introduction

Background

1.1 The present study “Economic Analysis of Cost and Return of Off-Season Vegetables with Focus on Polyhouse Effect” was undertaken by three Agro –Economic Research Centres namely, Shimla, Delhi and Santiniketan with the guide lines of Directorate of Economics and Statistics, Ministry of Agriculture and Farmers welfare, Government of India during the year 2015-16. The Agro –Economic Research Centre, Shimla was the coordinator of the studies conducted in the States of Himachal Pradesh, J&K by AERC, Shimla, in Uttarakhand by AERC, Delhi and in Sikkim by AERC, Santiniketan. The studies were consolidated by AERC, Shimla with the assistance of AERC, Santiniketan.

1.2 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.

1.3 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.

1.4 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.

1.5 Increased demand for vegetables due to rapid urbanization and growing tourism has 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 practiced in both ways i.e. with and without the help of polyhouses.

General Features of Agriculture in Himachal Pradesh

1.6 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 meager 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

1.7 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 adds 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:

Table: 1.1 Agro-Climatic Zones in Himachal Pradesh

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.

General Features of Agriculture in Jammu & Kashmir

1.8 Agriculture plays a very prominent role for the development of economy of Jammu & Kashmir State. The state has a cultivable area of 8.58 lacs hectares. Around 70 per cent of the population in the State gets livelihood directly or indirectly from agriculture and allied sectors. As per census 2011, 41 percent (out of main and marginal workers taken together) are engaged in agricultural activities. The State comprises of three regions; namely, Jammu, Kashmir and Ladakh having distinct geographical outlook and agro-climatic zones. Each zone having its own characteristics that largely determines the cropping pattern and productivity of crops. Seed replacement ratio is very low in Jammu & Kashmir, still those varieties are used which were developed 30 years ago affecting yield parameters adversely. The production of three major crops paddy, maize and wheat in Jammu & Kashmir state is more than 90 percent of the total food-grain production of all crops and rest is shared by other cereals and pulses. Commercial crops are the cash crops and help for invigorating agriculture sector. The State has a cultivable area of 8.58 lacs hectares around 12 percent of gross area sown. The net area sown during 2013-14 was 741 hectares. About 89 percent of the net irrigated area is irrigated through canals irrigation facility is presently available only to 43 percent of the net area sown. A major constraint to the development of agriculture in J & K is the fact that only 50 percent of the ultimate irrigation potential of the State is harnessed. The share of agriculture and allied activities to GSDP is 17.49 percent as per advanced estimates for 2014-15. The share of the horticulture sector in the agriculture GSDP is about 45 percent. About 94 percent of the operational holders fall in the category of marginal and small farmers, 5 percent in the semi-medium farmers, one percent in the medium farmers and 0.04 percent in the large farmers. The average size of holding size is 0.67 hectares.

Off-Season Vegetables in Jammu & Kashmir

1.9 Off season vegetables are the valuable cash crops of Jammu & Kashmir and are cultivated by the growers in their crop field as well as in polyhouses. As there is huge demand for off-season vegetables, farmers get more prices out of their produce. Vegetable nursery raising under poly houses is very popular in J&K. Generally in Kashmir region, in polyhouses only seedlings are raised and by planting these seedlings in the field, the yield is taken in advance than the normal method of direct sowing. Raising of vegetable nursery in polyhouses has many folds benefits such as easy management, early nursery and protection from biotic and abiotic stress. This technology fetches the higher prices due to marketing of produce in off season. Such production system has extended the growing season of vegetables and also their availability whole the year. The seedlings of cucurbits, tomato, chilli, capsicum, brinjal, cucumber, cabbage, cauliflower and broccoli are grown under plastic cover in the polyhouses.

1.10 The government in Kashmir has taken an initiative to provide polyhouses at subsidized rates to farmers to help them increase vegetable production and also protect their crops from vagaries of fluctuating weather. The initiative has benefited farmers of several villages of Budgam district and the government is expending it to other districts as well. Using polyhouse facilities by the farmers in Kashmir, the early sapling production is leading to a surge in sales of vegetables. Farmers grow saplings in their polyhouses for their kitchen gardens and large acres of land used for commercial purposes. The main off season vegetables grown in the fields in Jammu & Kashmir are knolkhol, peas, tomato, French beans, radish, cauliflower, cabbage and capsicum. However, the off-season vegetable/seed industry in Kashmir received a serious setback due to the turmoil in Kashmir valley over the past few years. As a result of disturbed conditions in the valley the vegetable seed industry is facing number of difficulties.

General Features of Agriculture in Uttarakhand

1.11 For the hilly state of Uttarakhand, cultivation of vegetables constitutes an important part of agricultural activity undertaken with about 22.65 per cent of the area under production being devoted to vegetables. Since the climatic conditions of the hilly states are not suitable for production of conventional crops, diversification in terms of the vegetables offers enormous opportunity for the cultivators in the state. In that respect off-season vegetable crops have huge potential.

Off-Season Vegetables in Uttarakhand

1.12 The off-season vegetables' farming refers to the production of vegetables by using different agro-climatic condition, adjusting the time of transplanting, selecting and improving the varieties and/or creating a controlled environment. In fact, the agro-climatic condition of the hills is conducive in the production of vegetables such as tomato, cauliflower, cabbage, vegetable pea, cucumber, French beans, capsicum etc. in different zones in the hills. Farmers also have higher incentive to grow off-season vegetables since they get higher value from producing these vegetables during summer and rainy season. This is because the off-season vegetables that are raised in the hilly areas are made available to the consumers in the plains at the time when these cannot be grown there due to hot climatic condition. Moreover, with the availability of new technology, it has become much easier for them to overcome the seasonal barriers associated with hill farming making farming more remunerative for them.

General Features of Agriculture in Sikkim

1.13 Sikkim is a hilly State in the Eastern Himalayas where agricultural practices and adaptations are highly variable in time and space due to varying altitudes and agro-climatic situations. The surveyed net cultivable area in Sikkim is estimated to be around 79,000 hectare (11.13%); with irrigated area of 15% of the total operational holdings of 1,10,000 hectare. About 80% of the people are directly or indirectly dependent on scarce land resources for their livelihood. The state has limited scope of industrial growth, and hence not adequately succeeded in decreasing the pressure on agriculture/horticulture. The agrarian population has decreased at minimal since its merger with the Indian Union (1975). The contribution of horticulture to the state's domestic product will also be of overwhelming importance. The sector, therefore, will have to receive priority attention for higher levels of rural prosperity.

Off-Season Vegetables in Sikkim

1.14 Cash and commercial crops like large cardamom, ginger, orange, seed potato, flowers and off-season vegetables along with other horticultural crops (varieties of fruits, root and tuber crops, mushroom, honey, nuts, spice crops like turmeric, seed spices etc. medicinal and aromatic plants) are dealt by the Horticulture Department (now renamed as Horticulture & Cash Crops Development Department) since its creation in 1996, whereas the Agriculture Department (now renamed as Food Security & Agriculture Development Department) looks after cereals like rice, wheat, maize, finger-millet, barley and buckwheat, pulses like urd, ricebean, rajmash, fieldpea,

cowpea and cluster-bean, oilseeds like rapeseed, mustard, soybean and safflower, and agricultural miscellaneous crops.

1.15 The situation in Sikkim, however, is a bit different from other parts of the country. In Sikkim organic farming has been a traditional way of cultivation adopted by farmers. In the traditional method rainfed farming dominated the agrarian scenario. Moreover, Sikkim is the first state in the country to have officially adopted the method of Organic Farming throughout the whole state. Keeping in view the goal of long term sustenance of soil fertility, environment and ecology the state is currently following very strict norms of organic cultivation by replacing the usage of chemical fertilizers with organic amendments like vermicompost, FYM, bio-fertilizer, bio-pesticides, etc.

1.16 The concept of protected cultivation has revolutionized horticulture worldwide bringing about a major breakthrough in vegetable and flower cultivation in particular. Use of greenhouse/polyhouse fitted with automatic drip system of irrigation has substantially contributed to adoption of floriculture by farmers. In Sikkim, specially designed low cost greenhouses have become very popular. Across the entire state such low cost greenhouses are found in abundance which is being utilized for cultivation of tomato, capsicum, cabbage, cauliflower and various kinds of flowers and many other crops.

1.17 At the same time the state has been giving emphasis in cultivation of off-season vegetables and flowers both under protected conditions of polyhouse as well as field crops. Sikkim's environmental and climatic diversity being a comparative advantage over others states for such cultivation, the state has been encouraging the farmers to indulge in floriculture and horticulture. In the process the government has been making provisions of a wide range of assistances for the farmers. "As a result of various interventions, this sector has been able to achieve much in area expansion under different commercial crops. Increased productivity, high level of crop diversification and technological inputs are some of the manifestations of departmental interventions. Tangible area increase under flowers and vegetables has been achieved over the years especially cultivation of off-season vegetables. Protected cultivation, a notion quite remote a few years back now have evolved into one of the most effective inputs for flowers and vegetables.

1.18 Off-season vegetables in Sikkim include tomato, cabbage, capsicum, cauliflower etc. Most of the vegetable crops are grown both as greenhouse and open crop throughout." It is by the success of off-season vegetables, more farmers are showing interest in cultivation of vegetables. The department encourages production of vegetables like cabbage, cauliflower, radish, carrot

and broccoli in the higher reaches during off-season. In some pockets in higher reaches, it is common practice to intercrop potato and pea or maize, pea, cabbage and ginger. Traditional vegetables like pea and beans have always remained the strength and programmes are being devised to augment seed production of these vegetables. Chayote is another traditional vegetable which can be very successfully grown in many parts of the State. South Sikkim leads in production of chayote as well. The most critical intervention to promote vegetable cultivation in the State has been the use of hybrid and improved seeds, better quality organic inputs and educating the farmers about production timing to coincide with peak market demands.

1.19 The Sikkim Centre of Indian Council of Agricultural Research (ICAR) is playing vital role in strengthening the vegetable production in Sikkim and has been working in close association with farmers for dissemination of scientific knowledge by field demonstrations, providing seeds and technological backstopping to develop self-reliance in vegetable production in the state. In order to boost the vegetable production in the state Sikkim, the ICAR-Centre organized Front Line Demonstration (FLD) on 'Year Round Vegetable Production Technologies' under Horticulture Mission for North East and Himalayan States (HMNEH-I) at Sirwani Basti, East Sikkim on 22nd November 2013. A total of 47 farmers attended the program and showed keen interest to learn the ICAR vegetable production technologies.

Review of Literature

1.20 **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 is 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.

1.21 **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.

1.22 **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.

1.23 **Tripathi and Sharma (1998)** made an attempt to work out farm gate price, mandi sale price, marketing costs, margins and price spread of vegetable pea grown by 20 farmers sampled from two villages at Tehri Garhwal district of Uttarakhand. They marketed their produce at Dehradun Mandi of the state through various marketing channels. The study revealed that vegetable pea, grown as offseason vegetable crop in the month of March, occupied 37 per cent of total vegetable area. The produce of the area was marketed through three main marketing channels: (i) producer-consumer, (ii) producer-commission agent/wholesaler-retailer-consumer and (iii) producer-local contractor/forwarding agent/ commission agent/wholesaler-retailer-consumer. Of the total marketing cost of green pods of vegetable pea, about 20 per cent was handling and transportation charges, 10 per cent octroi and other taxes. Further 5 per cent were packing charges and 6.5 per cent were miscellaneous expenses.

1.24 **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.

1.25 **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 lose 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.

1.26 **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.

1.27 **Parmar (2009)** investigates impact of integrated effect of fertilizers, bio-fertilizers and organic manures in enhancing overall productivity, profitability and quality of off-season vegetables under cold arid Himalayan conditions. The study revealed that the productivity, profitability and quality of pea, potato and cabbage in cold arid conditions could be increased with the combined application of synthetic fertilizer, farmyard manure and bio-fertilizers.

1.28 **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. A substantial increase in the area and production of vegetables has been observed under Mini-Mission-II scheme of Technology Mission. The intensity of cropping in the study area has become more than 250 per cent due to multiple cropping of vegetable crops. On an average, producers' marketed surplus has been found more than 92 per cent of the total production of selected vegetables. However, the estimates of regression function have revealed that spoilage at farm level and consumption has shown a negative contribution to marketed surplus. Moreover, marketing losses at various stages have also been noticed. The price spread of vegetables with respect to various marketing channels has indicated that 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. The paper therefore highlighted the need for effective measures to reduce marketing losses at various stages and has emphasized on the strengthening of institutions and development of market infrastructure in the area.

1.29 **Bala et al. (2010)** conducted a study to examine the costs and returns involved in production of major off-season vegetables in Kullu district of Himachal Pradesh. For this study, primary data on various socio-economic aspects, cropping pattern, inputs used and crop yields were collectedd for a sample of 100 farmers in two vegetable-dominated developmental blocks, namely, Banjar and Kullu of Kullu district using survey method. The study was confined to selected vegetables like tomato, cabbage, cauliflower and pea. The average operational holding of the sampled farms was found to be 0.64 hectare and a cropping intensity of 250 per cent was realized. Vegetables were found to occupy above 80 per cent of the total cropped area. The per quintal cost of cultivation is found to be highest for peas, followed by cauliflower, tomato and cabbage. The study revealed that per hectare cost A_1 was highest for tomato followed by cabbage. It was minimum for pea among the selected vegetables. The cost A_1 was lower for the large farm category farmers as compared to the small farms for all the crops except tomato. Plant protection was the major constituent of cost A_1 incurred for the production of all crops followed by the expenditure on seed and fertilizers. Since vegetable cultivation is labour intensive, significantly high costs were incurred for human labour ranging from Rs. 13,555 to 14,999 per hectare. Per hectare gross returns were the highest for tomato followed by cauliflower, cabbage and pea. The net returns over cost A_1 also varied. The cost of plant protection can be reduced by educating farmers about the integrated measures of pest management and by adopting organic farming practices. The study suggested that if some handy and efficient tools are made available to the farmers for performing intercultural operations like hoeing, weeding etc., the labour cost can be reduced and the enterprise can become remunerative.

1.30 **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.

1.31 **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.

1.32 Bala**, Brij 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.

1.33 **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 traditional marketing channel (TMC). The marketing margins of various agents operating in the trade of tomato were also higher in traditional marketing channel (TMC) (Rs.298/qtl.) as compared to emerging marketing channel (EMC) (Rs.258/qtls.). Marketing efficiency was 1.95 in case of emerging marketing channel (EMC) and 0.50 in traditional marketing channel (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.

1.34 **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

1.35 **Poudel (2012)** analysed marketing margin of off-season vegetables value chain in Surkhet-Dailekh road corridor. Cost of production and producer's price were calculated at collection point of Bubairakhe in Goganpani VDC of Surket, and consumer's price observed at 30 km far end market in Brindranagar municipality of Surkhet. The authors found a huge gap in the marketing margin in all types of off-season vegetables value chain. The share of post- harvest loss was observed as the first important factor for high marketing margin in tomato (42 per cent) and cauliflower (37 per cent). However, it was found to be the third important factor in cabbage (28 per cent). The profit margin kept by value chain actors, in contrast to common perception, was observed to be the second most important factor for increasing marketing margin in tomato (31 per cent), cauliflower (28 per cent) and cabbage (44 per cent). He concluded that appropriate attempts to reduce post harvest loss in off-season vegetables value chain might be an important way for reducing marketing margin in off-season vegetables value chain.

1.36 **Joshi et al. (2012)** conducted a study to; estimate cost of production of various crop enterprise and crop rotations followed under polyhouse cultivation; workout financial feasibility of vegetable cultivation under polyhouse and seek farmers' opinion about the polyhouse scheme and its prospects for future expansion. The analysis of the data collected through survey method for the agricultural year 2007-08 from Lohaghat block of Champawat district, Uttarakhand revealed that in Champawat district production of off- season vegetables in polyhouse was found to be beneficial to the producers as well as consumers. The establishment cost of polyhouse was found to be economically feasible and benefit-cost ratio was greater than one in presence of subsidy. The farmers were satisfied with the financial scheme of polyhouse executed by government in the studied area. However, certain additional provisions like drip irrigation system, availability of water tanks and sprinklers etc. have to be included in the scheme for secured irrigation. Currently vegetables produced under polyhouse are locally disposed off. However, in future, if the area under polyhouse cultivation is increased, there will be need of developing transportation facilities and good market for viability of vegetable cultivation in polyhouses in the district of Champavat, Uttarakhand.

1.37 **Mishra et al. (2014)** have carried out the economic analysis of marketing of major vegetables in Varanasi district of Uttar Pradesh India. The results 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.

1.38 **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.

1.39 **Singh et al (2014)** conducted a study of off season vegetables in Uttarakhand. The climatic conditions of hills in Uttarakhand offer bright potential for cultivation of off-season vegetables in different altitudes in summer and rainy seasons. However, various biotic and abiotic factors are the major hindrance in achieving the desired yield potential. Use of mulches in vegetable production offers a cheap and practical solution to combat these problems under the existing climatic conditions. In the course of this study, Krishi Vigyan Kendra, Gwaldam (Chamoli) conducted workshops at farmers' field about off season vegetable cultivation using black plastic mulching technology in five adopted villages during 2008- 2010 (three years) in order to extend the technology to vegetable growers and to assess its economic feasibility under hilly terraced land. The study revealed that black plastic mulching advanced the harvesting of summer squash by 10 days, while in tomato and capsicum, the advancement was of two weeks. This intervention increased the yield of tomato and summer squash by 31.60 per cent and 46.69 per cent respectively. The maximum benefit per unit cost of cultivation was observed in summer squash, while tomato cultivation under black plastic mulch was found to be the best with respect to net returns and benefit-cost ratio (BCR). In fact, IBCR value was maximum for summer squash (4.26), followed by tomato and capsicum. Authors concluded that plastic mulching increases production and productivity of off season vegetables and help vegetable growers in achieving self sufficiency besides reducing work load of women.

1.40 **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.

1.41 **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.

1.42 **Imran et al. (2015)** conducted a study to examine off season vegetables production under natural environment in hilly area during *Kharif* season 2014. The field experiment was carried out in randomized complete block design (RCBD) having 600 plots at three different locations and altitudes and tomato, cucumber, French bean, squash and peas were grown in all three locations. From the results it was observed by the authors that all types of vegetable cultivars positively responded for high yield at different location and altitude. Maximum yield of tomato and cucumber was recorded in Kalam while in Behrain, squashes and peas produced highest yield and in Madyan highest yield was observed in case of French beans. Kalam valley temperature was a little bit varied in vegetable growing season. 15- 20 days difference was recorded in crop germination, development and growth in different location due to different altitudes in Madyan, Behrain and Kalam. On the basis of the above result it was concluded that Swat valley, especially Upper Swat is most suitable for off-season vegetable production under natural environment to enhance the socio-economic condition of the farmer community.

1.43 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

1.44 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.

1.45 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

1.46 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 upon both primary and secondary data. In 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. While in Jammu & Kashmir study is limited to growing of five main off season vegetable crops namely knolkhol, tomato, cauliflower, cabbage and capsicum outside polyhouse. Inside polyhouse, the farmers of J&K were growing only seedlings. Further in Uttarakhand study is limited to six off-season vegetable crops, namely peas, tomato, cauliflower, cabbage, capsicum and French bean. Even for these six vegetables the primary data has been collected in two phases-once for those grown without polyhouse and then for those grown inside it. In Sikkim six vegetables, viz. peas, cabbage, cauliflower, French bean, tomato and capsicum have been selected for the study.

Outside Polyhouse Cultivation

2.2 The secondary data on area, production and productivity of vegetable crops grown in these four states was collected from the Directorate of Agriculture of the respective states.

Table: 2.1 Selection of Area

Sr. No.	States	Districts	Blocks	Villages
1	Himachal Pradesh	Shimla	Theog	Majhar, Kamayan ,Khalasi, Chaihr
		Mandi	Karsog	Pangna, Goden, Mashog, Kotlu
2	Jammu-Kashmir	Anantnag	Anantnag	Bangider
		Budgam	Chadoosa	Bujam
3	Uttarakhand	Dehradun	Chakrata	Atal, Anu, Mahendrath, Thartha, Kotikanasar
		Nainital	Dhari	Gahna, Parvada, Ladphora, Gunigaon, Dhanachuli
4	Sikkim	East	Gangtok	Largow bari, Sazong Rumtek, Upper Syari, Assam Linzey, Basilekha, Daragaon
		West	Namchi	Kamrang, Perbing Khop, Lower Kamrang, Jaubari, Perbingtar, Upper Ghurpisey

On the basis of this data, a multistage stratified random sampling technique was used in the selection of the districts, blocks, villages and finally the vegetable growers.

Classification

2.3 In this phase of sampling, attempt has been taken for selection of sample vegetable growers in the study area. The farmers have been classified in three size categories based on operational holding as : Marginal farmer, having total operational holding up to 1 ha., Small farmer, having total operational holding of 1 to 2 ha. and Medium farmer, having total operational holding above 2 ha.

2.4 There were 53 percent marginal farms, 32 percent small farms and 15 percent medium farms in all the areas of Himachal Pradesh. In Jammu & Kashmir there were 100 percent

Table 2.2 Classification of Sampled Farms according to their Size of Land Holdings

Particulars	States	Districts	Farmers			
			Marginal (up to 1 ha.)	Small (1-2 ha.)	Medium above 2 ha.)	Total
1.	Himachal Pradesh	Shimla	34 (56.67)	16 (26.67)	10 (16.67)	60 (100)
		Theog	30 (50.00)	22 (36.67)	8 (13.33)	60 (100)
		All	64 (53.33)	38 (31.67)	18 (15.00)	120 (100)
2.	Jammu & Kashmir	Anantnag	60 (100)	-	-	60 (100)
		Budgam	60 (100)	-	-	60 (100)
		All	120 (100)	-	-	120 (100)
3.	Uttarakhand	Nainital	49 (80)	10 (16)	2 (3)	61 (100)
		Dehradun	52 (85)	4 (7)	5 (8)	61 (100)
		All	101 (83)	14 (11)	7 (6)	122 (100)
4.	Sikkim	East	54 (90.00)	6 (10.00)	-	60 (100)
		West	56 (93.33)	4 (6.67)	-	60 (100)
		All	110 (91.67)	10 (8.33)	-	120 (100)

marginal farms and in Uttarakhand the percentage figure of marginal, small and medium farmers were 83, 11 and 6 percent respectively. In Sikkim 91.67 percent of the farmers were marginal and 8.33 percent belong to small categories.

Collection of Data:

2.5 As mentioned earlier, secondary data on area, production and productivity of vegetable crops grown in these four states were collected from the Directorate of Agriculture, of the respective states. On the basis of this data, a multistage stratified random sampling technique was used in the selection of the districts, blocks, villages and finally the vegetable growers. 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.

2.6 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.

2.7 In Jammu & Kashmir eighty percent produce of the selected households was sold in local markets and the rest in the far away market Jammu. Therefore, detailed information's regarding market charges, methods of sale etc. were collected from this market.

2.8 In Uttarakhand and Sikkim primary data have been collected through personal interview method. The secondary information has been obtained from various published and unpublished sources including official records of relevant government departments.

2.9 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.

Cost A_1: 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.).

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.

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 is measured as: 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.

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 A_2, Cost B & Cost C)** The Cost A_2 is the sum of Cost A_1 &b Rent paid for leased in land; whereas Cost B = A_2+ 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.

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

2.11 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)

2.12 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 fulfill the objectives five, six and seven related to the costs, returns and marketing of off season vegetables inside polyhouse, the information /data was taken from the study “An Economic Analysis of Protected Cultivation Under MIDH” in the States of Himachal Pradesh, J&K and Sikkim. The study was based on 100 polyhouse farmers grouped into three categories

according to size of polyhouse i.e. small (upto 250 m^2), medium (250m^2 to 500m^2) and large (500m^2 to 1000m^2). Accordingly, there were 29 small, 32 medium and 39 large polyhouse farmers in Himachal Pradesh. In Jammu & Kashmir all the polyhouses fall in one category, i.e. small (upto 250 m^2). In Sikkim 100 farms belong to small category (less than 250 mt^2). But in Uttarakhand, the data was collected at the second stage and all farmers belong to the small category with the size of their polyhouses ranging between 32.85 m^2 and 100 m^2.

Reference Period

2.14 The reference period of the study was Agriculture year 2015-16.

Limitations of the Study

2.15 In Himachal Pradesh and Jammu & Kashmir 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

2.16 In Uttarakhand data on all six vegetables could not be obtained for cultivation inside polyhouse because one of the vegetables, cabbage, was grown by only one of the sampled farmers farming inside polyhouse and hence was dropped from the study for rationalization. Secondly, for cultivation without polyhouse the sample size of this study turned out to be 122 instead of 120 since the field data was available for that many farmers and no criteria was available to exclude some. Thirdly, instead of selecting two districts for studying vegetable cultivation inside polyhouse as was laid down in the sampling design, a single district was selected since most of the polyhouses in the state were located in this district and the rest had very either very few or none. Lastly, in many cases, especially with respect to the problems faced by the farmers, the responses of the sampled farmers to similar questions seemed inconsistent. However, they have not been excluded to maintain the sample size specified under study.

2.17 The cost of cultivation taken for the selected vegetables in Sikkim belong to various terrains of Sikkim, though agro-climatic conditions are more or less same yet due to variation of

altitudes, costs may differ. Moreover, these costs are not any way comparable with the cost of cultivation in plain area. Information collected for the farmers with direct method with utmost care and cross-examination, but it may slightly differ owing to change of season and availability of inputs and of the prevailing economic factors.

CHAPTER – 3

Area, Production and Productivity of Vegetable Crops

3.1 In this chapter an attempt has been made to work out the changes and growth in area, production, productivity of important vegetable crops grown in the State of Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim.

Area under Vegetables

3.2 The area under different vegetable crops in the state of Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim is given in the following table. In Himachal Pradesh the area under various vegetables grown during the year 2014-15 was 73894 hectares. The data in the table depicts that the area, among the main six vegetables, was highest in peas i.e. 31.97 percent followed by tomato (14.61%), cauliflower (7.02%), cabbage (6.52%), beans (5.09%) and capsicum (3.26%).

3.3 In Jammu & Kashmir total area under various vegetables during the year 2014-15 was 21140 hectares. The area, among the main five vegetables, was highest in knolkhal (13.59%), followed by tomato (8.70%), cauliflower (4.43%), cabbage (3.94%) and capsicum.

3.4 Total area under various vegetables in the State of Uttarakhand during the year 2014-15 was 72338.33 hectares. The area, among the main six vegetables, was highest in peas (17.80%), followed by tomato (13.07%), cabbage (8.84%), beans (8.20%), cauliflower (4.38%) and capsicum (3.78%) respectively.

3.5 Total area under various vegetables in the State of Sikkim during the year 2014-15 was 15155 hectares. The area, among the main six vegetables, was highest in peas (13.53%), followed by cabbage (8.38%), beans (7.65%), tomato (6.86%), cauliflower (5.11%) and capsicum to a negligible extent.

Table 3.1 Area under Different Vegetables during 2014-15

(Area in Hectares)

Sr. No.	Particulars	States			
		HP	J & k	Uttarakhand	Sikkim
1	Tomato	10800 (14.61)	1840 (8.70)	9457.51 (13.07)	1040 (6.86)
2	Peas	23623 (31.97)	0.00	12873.17 (17.80)	2050 (13.53)
3	Cabbage	4819 (6.52)	834 (3.94)	6397.15 (8.84)	1270 (8.38)
4	Cauliflower	5191 (7.02)	936 (4.43)	3165.72 (4.38)	775 (5.11)
5	Beans	3760 (5.09)	0.00	5932.86 (8.20)	1160 (7.65)
6	Capsicum	2408 (3.26)	848 (1.01)	2736.02 (3.78)	30 (0.20)
7	Knolkhol	0.00	2873 (13.59)	0.00	0.00
8	Others Vegetables	23293 (31.53)	13809 (65.32)	31775.9 (43.92)	8830 (58.26)
Total		73894 (100)	21140 (100)	72338.33 (100)	15155 (100)

Source: Directorate of Agriculture Himachal Pradesh, Shimla-5, Directorate of Agriculture, Kashmir, Govt. of J&K., Directorate of Horticulture, Uttarakhand and Sikkim.

Note: Figures in parenthesis represent percentage share of a vegetable in total area under that vegetable in the state.

3.2 Production of Vegetables

3.6 The total production of various vegetables in the State of Himachal Pradesh during the year 2014-15 was 1576454 MT (Table 3.2). Data reveals that, among the main six vegetables, the production of tomato was maximum (30.19%), followed by peas (17.62%), cabbage (10.04%), cauliflower (7.42%), capsicum (3.50%) and beans (2.99%).

3.7 Total production of various vegetables in the State of Jammu & Kashmir during the year 2014-15 was 505793 MT, out of which production of knolkhol was 23.31 percent, followed tomato (9.94%), cauliflower (4.74%), cabbage (4.25%) and capsicum (2.99%).

3.8 In the state of Uttarakhand during 2014-15 total production of various vegetables was 657157.23 MT. The data in the table depicts that, in the production of all vegetables, the production of tomato was 17.56 percent, followed by peas (13.30%), beans (6.12%), cauliflower (5.83%) and capsicum (2.22%).

3.9 The table illustrates that the total production of various vegetables in the State of Sikkim during the year 2014-15 was 80876.9 MT. Production of peas was 10.95 percent, followed by tomato (9.94%), cabbage (8.87%), beans (6.63%), cauliflower (5.22%) and capsicum (0.13%) respectively.

Table 3.2 Production of Vegetables during 2014-15

(Percentage)

Sr. No.	Particulars	States			
		HP	J & k	Uttrakhand	Sikkim
1	Tomato	475965 (30.19)	50273 (9.94)	115413.4 (17.56)	8030 (9.94)
2	Peas	277718 (17.62)	0.00	87391.57 (13.30)	8850 (10.95)
3	Cabbage	158301 (10.04)	21517 (4.25)	74982.65 (11.41)	7170 (8.87)
4	Cauliflower	117012 (7.42)	23971 (4.74)	38320.06 (5.83)	4215 (5.22)
5	Beans	47203 (2.99)	0.00	40186.75 (6.12)	5360 (6.63)
6	Capsicum	55252 (3.50)	20228 (4.00)	14607.51 (2.22)	105 (0.13)
7	Knolkhol	0.00	73694 (23.31)	0.00	0.00
8	Others Vegetables	500255 (31.73)	316110 (62.50)	286255.29 (43.56)	47086.9 (58.26)
Total		1576454 (100)	505793 (100)	657157.23 (100)	80876.9 (100)

Source: Directorate of Agriculture Himachal Pradesh, Shimla-5, Directorate of Agriculture, Kashmir, Govt. of J&K., Directorate of Horticulture, Uttarakhand, Sikkim.

Note: Figures in parenthesis represent percentage share of a vegetable in total production under that vegetable in the State.

3.3 Productivity of Vegetable Crops

Productivity of vegetables crops in the respective states are given in Table 3.3.

3.10 In Himachal Pradesh the average productivity of tomato, peas, cabbage, cauliflower, beans capsicum, others vegetables was 441, 118, 328, 225, 126, 229, 215 and 213 quintals per

hectare. The productivity of tomato was observed to be maximum followed by cabbage, capsicum, cauliflower, other vegetables, beans and peas.

3.11 In Jammu & Kashmir, the average productivity of tomato, cabbage, cauliflower, capsicum, knolkhol and others vegetables was 273, 258, 256, 239, and 229 quintals per hectare respectively. The productivity of tomato was observed to be maximum followed by cabbage, knolkhol, cauliflower, capsicum and other vegetables.

3.12 In Uttarakhand the average productivity of tomato, peas, cabbage, cauliflower, beans, capsicum and other vegetable was 122.03, 67.89, 117.21, 121.05, 67.74, 53.39 and 90.09 quintals per hectare respectively. The productivity of tomato was maximum followed by cauliflower, cabbage, other vegetable, peas, beans and capsicum.

3.13 In Sikkim state the average productivity of tomato, peas, cabbage, cauliflower, beans, capsicum and other vegetable was 77.49, 43.08, 56.29, 54.43, 46.63, 26.25 and 53.27 quintals per hectare respectively. The data in the table depicts that the productivity of tomato was maximum followed by cabbage, cauliflower, other vegetables, beans, peas and capsicum.

3.14 The productivity of tomato was highest among all the states viz; Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim of India.

Table 3.3 Productivity of Vegetables during 2014-15

(Qtls./Ha)

Sr. No.	Particulars	States			
		HP	J & k	Uttrakhand	Sikkim
1	Tomato	441	273	122.03	77.49
2	Peas	118	-	67.89	43.08
3	Cabbage	328	258	117.21	56.29
4	Cauliflower	225	256	121.05	54.43
5	Beans	126	-	67.74	46.63
6	Capsicum	229	239	53.39	26.25
7	Knolkhol	-	257	-	-
8	Others Vegetables	215	229	90.09	53.27
Total		213	239	90.84	-

Source: Directorate of Agriculture Himachal Pradesh, Shimla-5, Directorate of Agriculture, Kashmir, Govt. of J&K., Directorate of Horticulture, Uttarakhand and Sikkim.

Note: Figures in parenthesis represent percentage share of a vegetable in total area under that vegetable in the state.

Changes in Area under Vegetables

3.15 Table 3.4 shows the change in area of vegetables from year 2005-06 to 2014-15 in Himachal Pradesh and it is noticed that during 2005-06 only 49.858 thousand hectares of land was under vegetable cultivation which increased to 73.894 thousand hectares in 2014-15, thus showing an increase of 48.21 percent. During this period year to year growth varied from 0.10 to 8.74 percent with the maximum registered 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.

For Jammu & Kashmir no data relating to area of vegetables was available during the year 2005-06 to 2013-14.

3.16 The following Table 3.5 captures the change in area under vegetables in Uttarakhand. It is seen from the table that the year-to-year increase in area under vegetables varied from 0.35 per cent to 10.95 per cent, with the maximum change of 10.95 per cent in 2014-2015. However, an overall increase of 42.61 per cent has been recorded since the year 2005-06. The sudden increase of 10.95 per cent in the last year could indicate that the state has witnessed a favourable shift in the pattern of vegetable during that year. The compound annual growth in area over the decade turns out to be 4.02 per cent. On fitting a linear trend equation to the data

on area under vegetables over time, it can be seen that the following equation explains the data: A = 2.036t + 49.17

Here 'A' denotes the area under vegetables in Uttarakhand (in 000' hectares) and 't' which takes the integer values 1-10 denotes the years during the period 2005-06 to 2014-15.

Table 3.5 Changes in Area under Vegetables in Uttarakhand during the period 2005-06 to 2014-15

Year	Area in 000' Hectares	Year to year percentage change	Percentage change from the base year 2005-06
2005-06	50.72		
2006-07	53.97	6.40	6.40
2007-08	56.24	4.21	10.87
2008-09	57.55	2.33	13.45
2009-10	58.45	1.57	15.23
2010-11	61.39	5.04	21.03
2011-12	62.96	2.55	24.12
2012-13	64.97	3.20	28.09
2013-14	65.20	0.35	28.54
2014-15	72.34	10.95	42.61

Source: *Directorate of Horticulture, Uttarakhand.*

3.17 Since couple of years Sikkim has gone through a process of development both in agricultural and horticultural cultivation. After adoption of organic method of cultivation and recurrent Central as well as State government scheme for horticultural development boosts the sector to a significant extent. Table-3.6 reveals that how over the period area under vegetable cultivation has positively changed. As far as availability of data is concerned we see in the year 2009-10 (taking 2007-08 as base year) the area under vegetable cultivation has significantly changed. Since 2007-08 to 2015-16, the percentage change from the base year estimates to be 30.68 per cent i.e. area under vegetable production has increased from 20,267 thousand hectare to 26,484 thousand hectare, with a CAGR of 3.40 percent.

Table 3.6 Changes in Area under Vegetables in Sikkim during the period 2005-06 to 2015-16

Year	Area ('000 ha)	Year to year percentage change	Percentage change from the base year
2005-06			
2006-07			
2007-08	20.267		
2008-09	21.487	6.02	6.02
2009-10	23.48	9.28	15.85
2010-11	24.515	4.41	20.96
2011-12	24.678	0.66	21.76
2012-13	25.472	3.22	25.68
2013-14	26.112	2.51	28.84
2014-15	26.109	0.01	28.83
2015-16	26.484	1.44	30.68
CAGR (2007-08 to 2015-16)			3.40%

Source: Horticulture & Cash Crops Development Department, Govt. of Sikkim

Changes in Production under Vegetables

3.18 Table 3.7 shows the change in production of vegetables in Himachal Pradesh during the period from 2005-06 to 2014-2015. It reveals that total vegetable production in the year 2005-06

Table 3.7 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

was 929976 MT, increased to 1576454 MT in the year 2014-15 registering an increase of 69.51 percent. During the period 2005-06 to 2014-15, year to year growth varied from 3.05 to 10.63 percent.

The trend equation of the above data using linear curve fitting is: Y = 844.34 + (70.83) x.

3.19 Table 3.8 showing changes in production of vegetables during last ten years. It reveals that an increase in vegetables production of about 59 per cent took place since 2005-06. However, it is pertinent to mention that there has been higher to marginal increase in production as well as periods of sharp fall in production. In spite of an increase in area under vegetables of 6.4 per cent, total production of vegetables (392380 tons in the year 2005-06) fell to 348430 tons in the following year. However, this fall was followed by a marked increase in annual production by about 50 per cent in the next year. The compound annual growth rate of vegetable production in Uttarakhand in the decade 2005-06 to 2014-15 turns out to be 5.29 per cent.

Table 3.8 Changes in Production under Vegetables Uttarakhand During the period 2005-06 to 2014-15

Year	Production (000' MT)	Year to year percentage change	Percentage change from the base year 2005-06
2005-06	392.38		
2006-07	348.43	-11.20	-11.20
2007-08	521.85	49.77	32.99
2008-09	461.07	-11.65	17.51
2009-10	524.24	13.70	33.60
2010-11	560.74	6.96	42.91
2011-12	575.04	2.55	46.55
2012-13	564.28	-1.87	43.81
2013-14	606.51	7.48	54.57
2014-15	624.12	2.90	59.06

Source: *Directorate of Horticulture, Uttarakhand.*

The following trend equation can be fitted to the data on production of vegetables in Uttarakhand:

P = 27.16t + 368.4 where P denotes the production in 000' MT and the variable t which takes integer values between 1 and 10 denotes the years starting 2005-06 till 2014-15.

3.20 Unlike changes in areas in the state of Sikkim, changes in production give an erratic picture. Table-3.9 shows that there are sorts of ups and downs in production over the years. Obviously that changes might not always have correlated with the change in areas, there are definitely others causes of production also. In terms of change in production the year 2009-10 gives a very rosy picture though in 2014-15 a slight fall in production in visible from the Table. Nevertheless, the CAGR of production stands at 4.72 percent over the period from 2007-08 to 2015-16.

Table 3.9 Changes in Production under Vegetables in Sikkim during the period 2005-06 to 2015-16

Year	Production ('000 MT)	Year to year percentage change	Percentage change from the base year
2005-06			
2006-07			
2007-08	93.032		
2008-09	96.039	3.23	3.23
2009-10	118.482	23.37	27.36
2010-11	124.36	4.96	33.67
2011-12	124.666	0.25	34.00
2012-13	129.196	3.63	38.87
2013-14	134.526	4.13	44.60
2014-15	134.3769	-0.11	44.44
2015-16	134.542	0.12	44.62
CAGR (2007-08 to 2015-16)			4.72%

Source: *Horticulture & Cash Crops Development Department, Govt. of Sikkim*

CHAPTER-4

Socio-Economic Profile of Selected Vegetable Growers

4.1 Information about the socio-economic variables of the selected vegetable growers of the study areas reveals the conditions under which they function. Land utilization, cropping pattern etc. will give the extent of area the farmers have put under actual use. Intelligence level, grade of education and economic bases of the farmers play a key role in understanding and also in implementing the modern and scientific methods and techniques in agricultural sector. It's not only the invention but innovation in terms of economic viability of the farmers plays a decisive role in augmenting the growth and development of the society. In this chapter an attempt has been made to study the socio-economic characteristics of vegetable growers of the four selected states viz., Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim in India.

Age, Occupation and Literacy of the Head

4.2 Age, occupation and literacy of the head of the family of sampled households are given in Table 4.1. In Himachal Pradesh 45% heads of the family belong to the age group of 41-60 years

Table 4.1 Age, Literacy and Occupation of the Head of the Family

Particulars		States			
		H.P	J&K	Uttarakhand	Sikkim
Age of the head	20-40 yrs.	35	3.33	14.75	16.7
	41-60 yrs.	45	78.33	50	82.5
	Above 61 yrs.	20	18.34	35.25	0.8
	Total	100	100	100	100
Literacy	Illiterate	10	31.67	23.77	10.8
	Primary	38.33	55	26.23	14.2
	Matric	43.33	13.23	42.62	47.5
	Graduate & above	8.34	-	7.38	14.2
Occupation	Agriculture	100	100	87.7	98.3
	Non-agriculture	-	-	3.28	0
	Any other	-	-	9.02	1.7
	Total	100	100	100	100

followed by the age group of 20-40 years (35%) and above 61 year (20%). In Jammu & Kashmir 78.33% heads of the family were in the age group of 41-60 years followed by the age group of 20-40 years (3.33%) and above 61 year (18.34%). Whereas, in Uttarakhand 50% heads of the family, were in the age group of 41-60 years followed by the age group of 20-40 years (14.75%) and above 61 year (35.25%). In Sikkim 82.5% heads of the family belong to the age group of 41-60 years followed by the age group of 20-40 years (16.7%) and above 60 years (0.08%).

4.3 The table further reveals that in Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim 10, 31.67, 23.77 and 10.8 percent heads of the sampled households were illiterate. In Himachal Pradesh the literacy rate among the heads of sampled households is comparatively high in comparison to Jammu & Kashmir, Uttarakhand and Sikkim. In Himachal Pradesh and Jammu & Kashmir hundred percent of heads of the sampled households reported agriculture as their main occupation. Whereas, in Uttarakhand 87.7 percent heads of the households reported agriculture as their main occupation followed by any other gainful activities (9.02%) and non-agriculture occupation (3.28%). While in Sikkim 98.3 percent of the households reported agriculture as their main occupation followed by other non agricultural occupation.

Demographic Profile

4.4 Demographic features of sampled vegetable growers given in Tables 4.2 reveals that in Himachal Pradesh 36.97, 38.09 and 29.24 percent are males, females and children. In Jammu & Kashmir males, females, and children percentage stated to be 32.45, 35.31, and 32.24 percent. In Uttarakhand these percentages register as 42.81, 39.06, and 18.13 percent, while in Sikkim these percentages are recorded as 41.30, 40.42 and 18.28 percent respectively.

4.5 Average family size was higher in Uttarakhand (9.63 persons) followed by Jammu & Kashmir (8.12 persons) Sikkim (4.74 persons) and Himachal Pradesh (4.73 persons) respectively. The persons between the age group of 16 to 60 years are considered to be fit for active physical works.

4.6 In Himachal Pradesh the proportions of male and female workers to total workforce are 52.08 and 47.92 percent while in Jammu & Kashmir the proportions of male and female to total workforce stated to be 47.37 and 52.63 percent respectively, whereas in Uttarakhand these percentages are 55.63 and 44.37 percent. In Sikkim the proportions of male and female workers to total workforce are 51.48 and 48.52 percent respectively.

Table 4.2 Demographic Profile of the Sampled Farmers

Particulates	States			
	H.P	J&K	Uttarakhand	Sikkim
Male	36.97	32.45	42.81	41.30
Female	38.09	35.31	39.06	40.42
Children	29.94	32.24	18.13	18.28
Total	100	100	100	100
Average Family size	4.73	8.12	9.63	4.74
Workers (16-60 yrs.)				
Male	52.08	47.37	55.63	51.48
Female	47.92	52.63	44.37	48.52
Total	100	100	100	100
Occupation				
Agri. labour				
Male	-	11.58	58.14	51.49
Female	-	-	41.86	48.51
Non-agri. labour				
Male	15.10	5.96	48.57	50
Female	7.81	-	51.43	50

4.7 The data in the table depicts that there was no agricultural labour among the sampled household in Himachal Pradesh. However the proportions of male and female non-agricultural labour (out of total workers) were 15.10 and 7.81 percent respectively. Further the proportions of male agricultural and non-agricultural labour (out of total workers) in Jammu & Kashmir were 11.58 and 5.96 percent, whereas in Uttarakhand the proportions of male and female agricultural labour (out of total workers) came out 58.14 and 41.86 percent. The proportions of male and female non-agricultural labour (out of total workers) came out 48.57 and 51.43 percent. In Sikkim the proportions of male and female agricultural labour (out of total workers) came out as 51.49 and 48.51 percent.

Social Classification

4.8 The caste-wise distribution of sampled farmers is given in Table 4.3. In Himachal Pradesh most of the sampled households (85%) fall in general category and few households belong to scheduled caste (8.33%) and other backward castes (6.67%).

Table 4.3 Social Classification of the Sampled Farmers

(Percentages)

Sr. No.	Particulars	States			
		H.P	J&K	Uttarakhand	Sikkim
1	SC	8.33	-	12.30	23.33
2	ST	-	-	47.54	43.33
3	OBC	6.67	-	0	23.33
4	General	85.00	100	40.16	10.00
	Total	100	100	100	100.00

4.9 In Jammu & Kashmir all of the sampled households fall in general category, whereas in Uttarakhand 12.30, 47.54 and 40.16 percent sampled farmers belongs to scheduled caste, schedule tribe and general category respectively. The data in the Table 4.3 further reveals that in Sikkim 23.33, 43.33, 23.33 and 10.00 percent sampled farmers belongs to scheduled caste, schedule tribe, OBC, general category respectively.

Farm Size and Utilization Pattern

4.10 The average size of land holding provides the basis for judging whether a holding is good enough for cultivation or not. The average size of land holding in Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim was observed as 1.16, 0.22, 0.64 and 1.10 hectares. In Himachal Pradesh, out of total land holdings, area under field crops, orchard and ghasni (grass land) was 60.96, 3.44 and 35.60 percent respectively.

4.11 In Jammu & Kashmir 100 percent of the land holding was reported to be under the field crops whereas in Uttarakhand 55.55, 23.59, 2.24, 7.97 and 9.64 percent area was under field crops, orchard, ghasni, barren land and fallow land respectively.

4.12 In Sikkim out of total land holdings 54.54 percent area was under field crops, whereas the area under orchard, fallow land and other fallow land was 9.09 percent each respectively.

Table: 4.4 Proportion of Various Type of Land Owned by the Sampled Farmers

States	Total land owned (ha.)			Cultivated land				Uncultivated Land			
	Irri.	Un-irri.	Total	Field crops		Orchard		Ghasni (Grass land)	Barren	Fallow land	Others
				Irri.	Un-irri.	Irri.	Un-irri				
H.P	47.02	52.98	100.0 (1.16)	44.50	16.46	2.52	0.92	35.60	-	-	-
J&K	100	-	100 (0.22)	100	-	-	-	-	-	-	-
Uttrakhand	60.22	39.78	100.00 (0.64)	36.49	20.06	17.30	6.29	2.24	7.97	9.64	0.00
Sikkim	45.45	63.64	100.00 (1.10)	36.36	18.18	0.00	9.09	0.00	0.00	9.09	9.09

Note. Figures in parenthesis denote area per farm.

Leased in and Leased out Land

4.13 Among the sampled farmers in Himachal Pradesh and Jammu & Kashmir the leased in and leased out system was not prevailing which can be seen from Table 4.5. In Uttarakhand 0.002 hectares of irrigated and 0.005 hectares un-irrigated land has been leased in and 0.001 hectares un-irrigated land has been leased out by the sampled households.

Table 4.5 shows that in Sikkim 0.03 hectares of irrigated and 0.04 hectares un-irrigated land has been leased in. The data further depicts that 0.04 hectares irrigated and 0.01 hectares un-irrigated land has been leased out by the sampled households.

Table 4.5 Distribution of Leased in and Leased out Land of the Sampled Farmers

(*Area in hectares)*

Particulars		H.P	J&K	Uttarakhand	Sikkim
Total land owned	Irrigated	0.54	0.22	0.38	0.45
	Un-irrigated	0.62	-	0.25	0.67
Leased in (+)	Irrigated	-	-	0.002	0.03
	Un-irrigated	-	-	0.005	0.04
Leased out (-)	Irrigated	-	-	0	0.04
	Un-irrigated	-	-	0.001	0.01
Net operated	Irrigated	0.54	0.22	0.39	0.42
	Un-irrigated	0.2	-	0.26	0.28

Source of Water for Irrigation

4.14 In Himachal Pradesh the sources of water for irrigation are tank and kuhl. The average distance of these sources from the farms was 0.339 and 0.088 km respectively. In Jammu & Kashmir, kuhl was the only irrigation sources among the sample households and distance of this source from the farms was 0.640 km. In Sikkim there was no canal, tube well, tank or other groundwater resources for irrigation purpose. Irrigation works in these two districts are mainly done by stacking of waters of the small rivulets or streams (locally called Jhora) over the mountain heads and distributed through polythene pipes into the crop fields. Approximate distance for carrying water from the sources ranges between 1.km to 1.89 km in the sample area.

Source of Drinking Water

4.15 The drinking water sources in Himachal Pradesh, Jammu & Kashmir and Uttarakhand among the sample households is given in Table 4.7.

4.16 In Himachal Pradesh tap water is the main source of drinking water followed by natural sources and distance of these sources are 0.044 and 0.40 km. respectively. In Jammu &

Kashmir tap water is the main sources of drinking water followed by natural source and average distance of these sources are 0.04 and 0.60 km. respectively. In Uttarakhand other sources are considered as the main drinking water sources followed by natural sources and tap water and average distance of these sources are 0.95, 1.66 and 4.51 km respectively. In Sikkim tap water is the main source of drinking water followed by natural source and average distance of these sources are 1.12 and 2.31 km respectively.

Table: 4.6 Average Distance of Water Sources for Irrigation of Sampled Farmers

(In Km.)

States	Sources				
	Canal	Tube well	Tank	Kuhl	Others
H.P	-	-	0.339	0.088	-
J&K	-	-	-	0.640	-
Uttrakhand	1.66	-	1.00	4.82	3.01
Sikkim	0.00	0.00	0.00	0.00	1.89

Table 4.7 Average Distance of the Source of Drinking Water of Sampled Farmes

(In Km.)

Particulars	Sources		
	Natural	Tap water	Others
H.P	0.4	0.044	-
J&K	0.6	0.04	-
Uttrakhand	1.66	4.51	0.95
Sikkim	2.31	1.12	0.00

Cropping Pattern

4.17 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 is presented in Table 4.8.

4.18 In Himachal Pradesh, 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 maize and wheat crops were most popular in the state. In Jammu & Kashmir the percentage area under maize and paddy crops has been worked out as 50 percent each for these two crops.

4.19 In Uttarakhand it is found that wheat is the main crop with 23.06 per cent area followed by other crops (19.78%), fruits (18.79%), potato (12.48%), maize (8.93%), paddy (7.42%) and barley (1.88%), whereas in Sikkim data reveals that potato is the main crop with 48.50 percent area followed by paddy (46.02 and maize (5.49%) respectively.

Cropping Intensity

4.20 Cropping intensity is one of the important indicators of production efficiency. Cropping intensity is also given in the Table 4.8. Cropping intensity (with fruits) was higher in Himachal Pradesh as compared to Jammu & Kashmir, Uttarakhand and Sikkim, whereas the cropping intensity (without fruits) has been worked out 200, 200, 120 and 139 among the sampled farmers of Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim respectively. The data in the table depicts that cropping intensity without fruits was higher in Himachal Pradesh and Jammu & Kashmir as compared to Uttarakhand and Sikkim.

Productivity of Crops

4.21 The productivity of various crops (excluding vegetables) is given in Table 4.9. It is found that the productivity of maize, wheat, barley, potato and fruits among the sampled households in Himachal Pradesh was 18, 19, 11, 115 and 223 quintals per hectare respectively. In Jammu & Kashmir per hectare productivity of paddy and wheat crops came out 40 and 32 quintals. In Uttarakhand per hectare productivity of maize, paddy, wheat, barley, potato, pulses and other crops were 34.32, 30.28, 16.70, 14.13, 184.73, 6.64 and 14.88 quintals respectively. In Sikkim per hectare productivity of maize, paddy and potato has been worked out to be 14.23, 36.88 and 73.08 quintals respectively.

Table 4.8 Cropping Pattern of the Sampled Farmers (Excluding Vegetables)

(Percentages)

Sr. No	Particulars	H.P	J&K	Uttrakhand	Sikkim
1	Maize	45.36	50	8.93	5.49
2	Paddy	-	50	7.42	46.02
3	wheat	38.38	-	23.06	0.00
4	Barley	9.37	-	1.88	0.00
5	Potato	2.37	-	12.48	48.50
6	Pulses	-	-	7.65	0.00
7	fruits	4.52	-	18.79	0.00
8	Others	-	-	19.78	0.00
9	Gross cropped area (ha.)	38.96	1.2	83.51	100.00
10	Cropping intensity with fruits (%)	209	200	134	139.2
11	Cropping intensity without fruits (%)	200	200	120	139.2

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

(Qtls./Ha.)

Particulars	States			
	H.P	J&K	Uttarakhand	Sikkim
Maize	18	-	34.32	14.23
Paddy	-	40	30.28	36.88
wheat	19	32	16.7	0
Barley	11	-	14.13	0
Potato	115	-	184.73	73.08
Pulses	-	-	6.64	0
Fruits	223	-	0	0
Others	-	-	14.88	0

Area under Off-Season Vegetables among the Sampled Farmers

4.22 The area under these vegetables crop is given in Table 4.10 which indicates that among all the sampled farmers in Himachal Pradesh, the area under peas was maximum (38.62%) followed by cauliflower (23.02%), beans (19.27%) cabbage (12.01%), capsicum (5.51%) and tomato (1.67%). Among all the sampled farmers in Jammu & Kashmir, the area under cabbage was maximum (37.77%) followed by cauliflower (37.44%), knolkhol (12.97%) tomato (6.24%) and capsicum (5.58%). In Uttarakhand, area under peas was maximum (35.63%) followed by tomato (21.88%), cabbage (19.89%), cauliflower (13.18%), capsicum (5.13%) and beans (4.28%) respectively.

Table 4.10 Area Under Different Vegetables Among the Sampled Farmers

(Ha.)

State	Vegetables							
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Knolkhol	Beans	All
H.P	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)
J&K	3.04 (6.24)	-	18.40 (37.77)	18.24 (37.44)	2.72 (5.58)	6.32 (12.97)	-	48.72 (100)
Uttarakhand	8.25 (21.88)	13.44 (35.63)	7.50 (19.89)	4.97 (13.18)	1.94 (5.13)	-	1.61 (4.28)	37.71 (100)
Sikkim	4.07 (12.92)	4.89 (15.52)	7.21 (22.89)	6.78 (21.53)	3.77 (11.97)	-	4.78 (15.17)	31.50 (100.00)

Table 4.10 further reveals that in Sikkim the area under cabbage was maximum (22.89%) followed by cauliflower (21.53%), peas (15.52%), beans (15.17%) tomato (12.92%) and capsicum (11.97%) respectively.

Productivity of Vegetable Crops

4.23 Among other factors, increase in area under vegetables and increase in productivity are considered to be important reasons for enhancing the supply of vegetables. The yield of various vegetables grown on the farms of selected growers is presented in Table 4.11. In Himachal Pradesh the area wise average 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.).

4.24 In Jammu & Kashmir the area wise average productivity of tomato was maximum (280 qtls./ha.) followed by cabbage (260 qtls./ha.), knolkhol (260 qtls./ha.), cauliflower (256 qtls./ha.) and capsicum (245 qtls./ha.), whereas among all the sampled households in Uttarakhand the area wise average productivity of cabbage was maximum (215 qtls./ha.) followed by tomato (211 qtls./ha.), cauliflower (193 qtls./ha.), capsicum (184 qtls./ha.), beans (115 qtls./ha.) and peas (91 qtls./ha.) respectively.

Table 4.11 Yield of Different Vegetables Grown by the Sampled Farmers

(Qtls./Ha.)

Particulars	Vegetables							
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans	Knolkhol	All
Himachal Pradesh	402	119	332	303	163	115	-	-
Jammu & Kashmir	280	-	260	256	245	-	260	-
Uttarakhand	211	91	215	193	184	115	-	168
Sikkim	298.85	124.93	240.68	234.00	496.05	133.85		219.83

In Sikkim the area wise average productivity of capsicum was highest (496.05 qtls. /ha.) followed by tomato (298.85 qtls./ha.), cabbage (240.68 qtls./ha.), cauliflower (234.00 qtls./ha.), beans (133.85 qtls./ha.) and peas (124.93 qtls./ha.) respectively.

Off-Season Vegetables Crop Rotation

4.25 The off-season vegetables crop rotation among the sampled farmers of Himachal Pradesh, Jammu & Kashmir and Uttarakhand can be seen in Tables 4.12 (a), 4.12(b) and 4.12(c).

Table 4.12 (a) Off Season Vegetables Crop Rotation in Himachal Pradesh

Vegetables	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 Jammu & Kashmir

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

Table 4.12 (c) Off Season Vegetables Crop Rotation in Uttarakhand

Vegetables	Irrigated		Un irrigated	
	Sowing/Planting	Harvesting	Sowing/Planting	Harvesting
Tomato	February, March, April, June	May, June, July, August	July	September
Peas	February, April, June, September, October	April, July, September, November, January	July	September
Cabbage	March ,April, June	June, July, September	July	September
Cauliflower	March, April, June	June, July, August	July	September
Capsicum	March, April	May, July	-	-
Beans	February, April	May ,July	July	September

4.26 Crop rotation is considered as an important agricultural activity in Sikkim. Table-4.12(d) & (e) reflects season-wise vegetables crop cultivation by vegetable grower of each district in Sikkim. The figures in parenthesis indicating percentages may not add up to 100 as a farmer may or may not have cultivated particular vegetable in a particular season. As also a farmer can grow more than one vegetable at any particular season. These Tables actually describe the

inclination or preference of the farmers to cultivate particular vegetables over different seasons. For example, sum of percentages under kharif is less than that of rabi and off-season, which reflects that the farmers prefer growing vegetable in the rabi and off-season over kharif season. This may further be investigated for particular crops as well. On the whole, these two newly constructed tables truly reflect the crop rotation pattern followed by the sample farms.

Table 4.12 (d) Vegetables Crop Rotation in District East of Sikkim

Vegetable	Irrigated		
	Kharif	Rabi	Off
Tomato	12 (20.00)	22 (36.67)	22 (36.67)
Peas	5 (8.33)	22 (36.67)	29 (48.33)
Cabbage	8 (13.33)	21 (35.00)	29 (48.33)
Cauliflower	7 (11.67)	28 (46.67)	23 (38.33)
Capsicum	8 (13.33)	21 (35.00)	23 (38.33)
Beans	9 (15.00)	17 (28.33)	22 (36.67)

** Percentage may not add up to 100, as a farmer may or may not have cultivated particular vegetable in a particular season. As also a farmer can grow more than one vegetable at any particular season.*

Table 4.12 (e) Vegetables Crop Rotation in District South Of Sikkim

Vegetable	Irrigated		
	Kharif	Rabi	Off
Tomato	10 (16.67)	22 (36.67)	22 (36.67)
Peas	16 (26.67)	21 (35.00)	18 (30.00)
Cabbage	14 (23.33)	20 (33.33)	26 (43.33)
Cauliflower	11 (18.33)	26 (43.33)	27 (45.00)
Capsicum	13 (21.67)	18 (30.00)	24 (40.00)
Beans	6 (10.00)	22 (36.67)	26 (43.33)

** Percentage may not add up to 100, as a farmer may or may not have cultivated particular vegetable in a particular season. As also a farmer can grow more than one vegetable at any particular season.*

Credit Structure among the Sampled Farmers

4.27 The credit structure of all the sampled vegetable farmers is given below in Table 4.13. It can be seen from the table that in Himachal Pradesh farmers have taken loans only from banks. The average principal amount of loan was Rs. 61167 at the 4% rate of interest. The outstanding amount of loan left to pay back was Rs. 5875. No information regarding availing or availability of farmer's loan from banks or other sectors is reported in Jammu & Kashmir.

Table 4.13 Credit Structure Among all the Sampled Farmers (for vegetables only)

(Rs./farm)

Particulars	States			
	H.P	J&K	Uttarakhand	Sikkim
i.Source of loan		-		
Bank	100%	-	100%	100%
Any other	-	-	-	-
ii.Principal amount	61167	-	94537	26250
iii.Out standing amount	5875 (9.6)	-	38438 (40.66)	0
Rate of interest (%)	4	-	4.98	7
No. of farmers taken loan	54/120	-	82/122	14/120

4.28 In Uttarakhand farmers have taken loans only from banks. The average principal amount of loan was Rs. 94537 at the 4% rate of interest. The outstanding amount of loan left to pay back was Rs. 38438. In Sikkim also farmers usually take loans from banks only. The average principal amount of loan was Rs. 26250 at the 7% rate of interest. The outstanding amount of loan left to pay back was found to be zero.

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. Costs and returns from various vegetable crops in these study areas are assessed separately. Different components of cost of cultivation for the selected off season vegetables crops are estimated according to the definitions given in Chapter Two. Further, gross income and net returns from these crops are analyzed in details. Since costs and returns of vegetable production would vary according to the farm sizes, therefore these are worked out and analyzed separately for different size of land holdings.

Cost of Cultivation of Vegetables Crop

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. 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. The cost of cultivation of tomato among the sampled farmers is given in Table 5.1.

5.4 In Himachal Pradesh on an average, total cost of cultivation of tomato was Rs. 96517/ha. on all the sampled farms. The material cost, being the major cost component, constituted 38.44

percent of the total cost followed by labour cost i.e. 31.57 percent and rental value of owned land 26.96 percent. 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. 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.

5.5 In Jammu & Kashmir on an average, total cost of cultivation of tomato was Rs. 93167 per hectare on all the sampled farms. The material cost, being the major cost component, constituted 36.71 percent of the total cost followed by labour cost i.e. 32.40 percent and rental value of owned land 27.73 percent. The share of manure was observed to be 16.65 percent followed by that of insecticides and pesticides (7.41%), seed/seedlings (6.41%), fertilizer (4.93%) and sticks (1.31%). The bullock labour was about 5 percent of the cost C. The amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.27, 0.02, 1.67 and 1.19 percent respectively.

5.6 In Uttarakhand, total cost of cultivation of tomato was Rs. 93167 per hectare on all the sampled farms. The labour cost, being the major cost component constituted 55.74 percent of the total cost followed by material cost i.e. 18.77 percent and rental value of owned land 16.89 percent. The share of seed/seedling was observed to be 6.71 percent followed by that of manure (4.92%), fertilizer (4.77%), insecticides and pesticides (2.34%). The bullock labour was 5.37 percent of the cost C. On the whole, the amount incurred on depreciation, interest on working and fixed capital was 1.89, 0.98 and 2.43 percent respectively.

5.7 In Sikkim on an average, total cost of cultivation of tomato was Rs. 205349.80 per hectare on all the sampled farms. The labour cost, being the major cost component, constituted 80.50 percent of the total cost followed by material cost i.e. 15.6 percent and rental value of owned land 3.1 percent in overall. The share of seed/seedling was observed to be 12.7 percent followed by that of manure (2.9%). The bullock labour was 2.2 percent of the cost C. On the whole, the amount incurred on depreciation and interest on working capital was 0.3 percent each respectively.

Table 5.1 Cost of Cultivation of Tomato Among Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	H.P	J&K	Uttarakhand	Sikkim	H.P	J&K	Uttarakhand	Sikkim
a.Human Labour (Hired)	13748	13208	15893	32313.60	14.24	14.18	8.43	15.7
b. Bullock Labour	4812	4604	10123	4421.05	4.99	4.94	5.37	2.2
c.Seed/Seedlings	5285	5975	12656	26012.78	6.51	6.41	6.71	12.7
d.Manure	17000	15513	9285	5974.20	17.61	16.65	4.92	2.9
e.Fertilizer	4620	4595	8997	0.00	4.79	4.93	4.77	0.0
f.Insecticides and pesticides	7978	6904	4420	0.00	8.27	7.41	2.34	0.0
g.Sticks	1215	1217	0	0.00	1.26	1.31	0.00	0.0
h.Depreciation (Implements and farm building)	259	254	3566	522.20	0.27	0.27	1.89	0.3
i.Land Revenue and taxes	18	15	0	0.00	0.02	0.02	0.00	0.0
j.Interest on working capital	1670	1561	1841	643.00	1.73	1.67	0.98	0.3
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0	0	4424	0.00	0.00	0	2.35	0.0
Total (Cost A_1)	**57604**	**53846**	**71206**	69886.83	**59.68**	**57.79**	**37.76**	34.0
l.Rent paid for leased in land	0	0	1848	438.60	0.00	0	0.98	0.2
Cost A_2 (Cost A_1+l)	**57604**	**53846**	**73054**	70325.43	**59.68**	**57.79**	**38.74**	34.2
m.Rental value of owned land	26021	25837	31848	6567.80	26.96	27.73	16.89	3.1
n.Interest on fixed capital (excluding land)	1027	1111	4585	0.00	1.06	1.19	2.43	0.0
Cost B (Cost A_2+m+n)	**84652**	**80793**	**109487**	76778.00	**87.71**	**86.72**	**58.06**	37.4
o.Imputed value of family labour	11865	12374	79074	128571.83	12.29	13.28	41.94	62.6
Cost C (Cost B+o)	**96517**	**93167**	**188560**	205349.80	**100**	**100**	**100**	100

Cost of Cultivation of Peas

5.8 In Himachal Pradesh on an average, total cost of cultivation of peas was Rs. 87989 per hectare on all the sampled farms. The material cost, being the major cost component, constituted 34.53 percent of the total cost followed by labour cost i.e. 32.82 percent and rental value of owned land 29.56 percent in overall. The share of manure was observed to be 21.55 percent followed by that of seed/seedlings (5.29%), insecticides and pesticides (4.81%) and fertilizer (2.88%). The bullock labour was 5.24 percent of the cost C. On the whole, the amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.25, 0.02, 1.60 and 1.21 percent respectively (Table 5.2).

Table 5.2 Cost of Cultivation of Peas Among Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	H.P	J&K	Uttarakhand	Sikkim	H.P	J&K	Uttarakhand	Sikkim
a.Human Labour (Hired)	11962		12039.66	15320.95	13.59		7.87	10.8
b. Bullock Labour	4612		7006.27	6707.20	5.24		4.58	4.7
c.Seed/Seedlings	4655		10006.41	3751.33	5.29		6.54	2.7
d.Manure	18966		5763.34	7591.18	21.55		3.77	5.4
e.Fertilizer	2534		3729.88	0.00	2.88		2.44	0.0
f.Insecticides and pesticides	4231		3007.06	0.00	4.81		1.97	0.0
g.Sticks	0		0.00	0.00	0		0.00	0.0
h.Depreciation (Implements and farm building)	222		4005.26	478.93	0.25		2.62	0.3
i.Land Revenue and taxes	18		0.00	0.00	0.02		0.00	0.0
j.Interest on working capital	1409		1246.58	266.63	1.60		0.82	0.2
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0		3657.55	0.00	0		2.39	0.0
Total (Cost A_1)	48608		50462.01	34116.23	55.24		33.00	24.2
l.Rent paid for leased in land	0		93.02	0.00	0		0.06	0.0
Cost A_2 (Cost A_1+l)	48608		50555.02	34116.23	55.24		33.06	24.2
m.Rental value of owned land	26012		33602.44	6567.80	29.56		21.97	4.6
n.Interest on fixed capital (excluding land)	1061		4545.28	0.00	1.21		2.97	0.0
Cost B (Cost A_2+m+n)	75681		88702.74	40684.03	86.01		58.01	28.8
o.Imputed value of family labour	12308		64215.02	100565.70	13.99		41.99	71.2
Cost C (Cost B+o)	87989		152917.75	141249.70	100		100	100

5.9 In Uttarakhand on an average, total cost of cultivation of peas was Rs. 152917.75 per hectare on all the sampled farms. The labour cost, being the major cost component, constituted 54.44 percent of the total cost followed by material cost i.e. 14.72 percent and rental value of owned land 21.97 percent in overall. The share of seed/seedling was observed to be 6.54 percent followed by manure (3.77%), fertilizer (2.44%), insecticides and pesticides (1.97%). The bullock labour was 4.58 percent of the cost C. On the whole, the amount incurred on depreciation, interest on working and fixed capital was 2.62, 0.82 and 2.97 percent respectively.

5.10 In Sikkim on an average, total cost of cultivation of peas was Rs. 141249.70 per hectare on all the sampled farms. The human labour cost, being the major cost component, constituted 82percent of the total cost followed by material cost i.e. 8.10 percent, bullock labour (4.7%) and rental value of owned land 4.6 percent in overall. The share of manure o was observed to be 5.4 percent followed by seed/seedling (2.7%). On the whole, the amount incurred on depreciation and interest on working capital was 0.3 and 0.2 percent respectively.

Cost of Cultivation of Cabbage

5.11 The cost of cultivation of cabbage among the sampled famers of all states is given in Table 5.3. In Himachal Pradesh on an average, total cost of cultivation of cabbage was Rs.93730 per hectare. Material cost, being the major cost component, constituted 37.16 percent of the total cost followed by labour cost i.e. 32.44 percent and rental value of owned land 27.33 percent in overall. The share of manure was observed to be 17.32 percent followed by that of seed/seedlings (7.25%), insecticides and pesticides (6.84%), and fertilizer (5.75%). The bullock labour was about 5.12 percent of the cost C. On the whole, the amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.25, 0.02, 1.68 and 1.12 percent respectively.

5.12 In Jammu & Kashmir on an average, total cost of cultivation of cabbage was Rs. 88974 per hectare .Material cost, being the major cost component, constituted 36.49 percent of the total cost followed by labour cost i.e. 31.75 percent and rental value of owned land 28.71 percent in overall. The share of manure was observed to be 17.31 percent followed by seed/seedlings (6.51%) fertilizer (6.34%) and insecticides & pesticides (6.33%).The bullock labour was 5.71 percent of the cost C. On the whole, the amount incurred for depreciation, land revenue, interest on working and fixed capital was 0.23, 0.02, 1.67 and 1.13 percent respectively.

5.13 In Uttarakhand on an average, total cost of cultivation of cabbage was Rs. 15749.98 per hectare. Labour cost, being the major cost component, constituted 48.34 percent of the total cost followed by rental value of owned land 21.39 percent and material cost i.e. 20.96 percent in overall. The share of seed/seedling was observed to be 7.19 percent followed by fertilizer (6.87%), manure (4.76%) and insecticides & pesticides (2.14%). The bullock labour was 4.81 percent of the cost C. The amount incurred on depreciation, interest on working and fixed capital was 2.31, 0.97 and 2.91 percent respectively.

Table 5.3 Cost of Cultivation of Cabbage Among Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	H.P	J&K	Uttarakhand	Sikkim	H.P	J&K	Uttarakhand	Sikkim
a.Human Labour (Hired)	12977	12009	10252.39	14858.75	13.85	13.50	6.51	9.7
b. Bullock Labour	4801	5083	7580.69	3694.93	5.12	5.71	4.81	2.4
c.Seed/Seedlings	6794	5797	11331.61	19634.95	7.25	6.51	7.19	12.8
d.Manure	16236	15398	7503.31	6567.18	17.32	17.31	4.76	4.3
e.Fertilizer	5387	5642	10818.41	0.00	5.75	6.34	6.87	0.0
f.Insecticides and pesticides	6414	5630	3374.76	0.00	6.84	6.33	2.14	0.0
g.Sticks	0	0	0.00	0.00	0	0	0.00	0.0
h.Depreciation (Implements and farm building)	235	205	3636.98	429.93	0.25	0.23	2.31	0.3
i.Land Revenue and taxes	18	15	0.00	0.00	0.02	0.02	0.00	0.0
j.Interest on working capital	1578	1487	1525.83	410.60	1.68	1.67	0.97	0.3
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0	0	4921.54	0.00	0	0	3.12	0.0
Total (Cost A_1)	54440	51265	60945.52	45596.33	58.08	57.62	38.68	29.8
l.Rent paid for leased in land	0	0	0.00	423.73	0	0	0.00	0.3
Cost A_2 (Cost A_1+l)	54440	51265	60945.52	46020.08	58.08	57.62	38.68	30.0
m.Rental value of owned land	25621	25547	33695.45	6567.80	27.33	28.71	21.39	4.2
n.Interest on fixed capital (excluding land)	1048	1006	4578.82	0.00	1.12	1.13	2.91	0.0
Cost B (Cost A_2+m+n)	81110	77817	99219.80	52476.55	86.53	87.46	62.98	34.2
o.Imputed value of family labour	12621	11157	58330.18	100761.83	13.47	12.54	37.02	65.8
Cost C (Cost B+o)	93730	88974	157549.98	153238.38	100	100	100	100

5.14 In Sikkim on an average, total cost of cultivation of cabbage was Rs. 153238.38 per hectare. Human labour cost, being the major cost component, constituted 75.50 percent of the total cost followed by material cost i.e. 17.10 percent in overall. The share of seed/seedling was observed to be 12.80 percent followed by manure (4.30%) The rental value of owned land and bullock labour was observed to be 4.20 and 2.4 percent of the cost C. The amount incurred on depreciation and interest on working capital was estimated to be 0.3 percent for each constituent respectively.

Cost of Cultivation of Cauliflower

5.15 The cost of cultivation of cauliflower among the sampled famers is given in Table 5.4. In Himachal Pradesh on an average, total cost of cultivation of cauliflower was Rs. 102187 per

hectare on all the sampled farms. The material cost, being the major cost component, constituted 41.13 percent of the total cost followed by labour cost i.e. 29.84 percent and

Table: 5.4 Cost of Cultivation of Cauliflower Among Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	H.P	J&K	Uttarakhand	Sikkim	H.P	J&K	Uttarakhand	Sikkim
a.Human Labour (Hired)	12859	11639	14598.83	7372.88	12.58	12.21	9.78	6.8
b. Bullock Labour	4612	4550	7358.96	3016.95	4.51	4.77	4.93	2.8
c.Seed/Seedlings	7916	7301	8303.73	20809.73	7.75	7.66	5.56	19.2
d.Manure	19667	19337	5751.75	6977.50	19.25	20.28	3.85	6.4
e.Fertilizer	7264	6732	4608.04	0.00	7.11	7.06	3.09	0.0
f.Insecticides and pesticides	7173	6597	3491.49	0.00	7.02	6.92	2.34	0.0
g.Sticks	0	0	0.00	0.00	0	0	0.00	0.0
h.Depreciation (Implements and farm building)	259	198	3773.12	456.00	0.25	0.21	2.53	0.4
i.Land Revenue and taxes	18	15	0.00	0.00	0.02	0.02	0.00	0.0
j.Interest on working capital	1785	1684	1323.38	351.60	1.75	1.77	0.89	0.3
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0	0	1645.66	0.00	0	0	1.10	0.0
Total (Cost A_1)	61553	58052	50854.95	38984.65	60.24	60.88	34.08	35.9
l.Rent paid for leased in land	0	0	1207.08	423.73	0	0	0.81	0.4
Cost A_2 (Cost A_1+l)	61553	58052	52062.03	39408.38	60.24	60.88	34.89	36.3
m.Rental value of owned land	26559	25773	32488.37	6567.80	25.99	27.03	21.77	6.0
n.Interest on fixed capital (excluding land)	1050	1066	4566.42	0.00	1.03	1.12	3.06	0.0
Cost B (Cost A_2+m+n)	89163	84891	89116.82	45864.88	87.25	89.03	59.72	42.3
o.Imputed value of family labour	13024	10459	60105.87	62621.83	12.75	10.97	40.28	57.7
Cost C (Cost B+o)	102187	95350	149222.69	108486.68	100	100	100	100

rental value of owned land 25.99 percent in overall. The share of manure was observed to be 19.25 percent followed by that of seed/seedlings (7.75%), fertilizer (7.11%), insecticides and pesticides (7.02%). The bullock labour was about 4.51 percent of the cost C. The amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.25, 0.02, 1.75 and 1.03 percent respectively.

5.16 In Jammu & Kashmir on an average, total cost of cultivation of cauliflower was Rs. 95350 per hectare on all the sampled farms. The material cost, being the major cost component, constituted 41.92 percent of the total cost followed by labour cost i.e. 27.95 percent and rental

value of owned land 27.03 percent in overall. The share of manure was observed to be 20.28 percent followed by seed/seedlings (7.66%) fertilizer (7.06%) and insecticides & pesticides (6.92%). The bullock labour accounted for 4.77 percent of the cost C. On the whole, the amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.21, 0.02, 1.77 and 1.12 percent respectively.

5.17 In Uttarakhand on an average, total cost of cultivation of cauliflower was Rs. 149222.69 per hectare on all the sampled farms. The labour cost, being the major cost component, constituted 54.99 percent of the total cost followed by rental value of owned land 21.77 percent and material cost i.e. 14.84 percent in overall. The share of seed/seedling was observed to be 5.56 percent followed by of manure (3.85%) fertilizer (3.09%) and insecticides & pesticides (2.34%). The bullock labour registered as 4.93 percent of the cost C. The amount incurred on depreciation, interest on working and fixed capital accounted as 2.53, 0.89 and 3.06 percent respectively.

5.18 In Sikkim on an average, total cost of cultivation of cauliflower was Rs. 108486.68 per hectare on all the sampled farms as given in Table 5.3. The human labour cost, being the major cost component, constituted 64.50 percent of the total cost followed by material cost i.e. 25.60 percent in overall. The share of seed/seedling was observed to be 19.20 percent followed by manure (6.40%) The rental value of owned land and bullock labour was observed to be 6 and 2.8 percent of the cost C. The amount incurred on depreciation and interest on working capital was estimated to be as 0.40 and 0.30 percent respectively.

Cost of Cultivation of Capsicum

5.19 The cost of cultivation of capsicum among the sampled famers is given in Table 5.5. In Himachal Pradesh total cost of cultivation of capsicum was Rs. 84940 per hectare among all the sampled farms. The material cost, being the major cost component, constituted 33.92 percent of the total cost followed by labour cost i.e. 33 percent and rental value of owned land 29.90 percent in overall. The share of manure was observed to be 13.66 percent followed by that of seed/seedlings (7.07%), fertilizer (6.69%), insecticides and pesticides (6.50%). The bullock labour was about 5.24 percent of the cost C. The amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.29, 0.02, 1.58 and 1.29 percent respectively.

Table 5.5 Cost of Cultivation of Capsicum Among Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	H.P	J&K	Uttarakhand	Sikkim	H.P	J&K	Uttarakhand	Sikkim
a.Human Labour (Hired)	11473	11500	7718.60	17898.80	13.51	14.52	5.28	9.5
b. Bullock Labour	4449	4200	6832.04	3371.43	5.24	5.30	4.67	1.8
c.Seed/Seedlings	6005	4750	14264.26	28343.48	7.07	6.00	9.75	15.0
d.Manure	11603	9000	7190.24	7573.05	13.66	11.36	4.92	4.0
e.Fertilizer	5679	5970	4780.58	0.00	6.69	7.54	3.27	0.0
f.Insecticides and pesticides	5517	5530	3558.96	0.00	6.50	6.98	2.43	0.0
g.Sticks	0	0	0.00	0.00	0	0	0.00	0.0
h.Depreciation (Implements and farm building)	250	220	3748.86	458.05	0.29	0.28	2.56	0.2
i.Land Revenue and taxes	18	15	0.00	0.00	0.02	0.02	0.00	0.0
j.Interest on working capital	1342	1228	1330.34	538.15	1.58	1.55	0.91	0.3
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0	0	755.70	0.00	0	0	0.52	0.0
Total (Cost A_1)	46336	42413	50179.59	58182.98	54.55	53.56	34.30	30.8
l.Rent paid for leased in land	0	0	2582.70	0.00	0	0	1.77	0.0
Cost A_2 (Cost A_1+l)	46336	42413	52762.30	58182.98	54.55	53.56	36.07	30.8
m.Rental value of owned land	25397	25240	31112.75	6567.80	29.90	31.87	21.27	3.5
n.Interest on fixed capital (excluding land)	1099	1058	4568.63	0.00	1.29	1.34	3.12	0.0
Cost B (Cost A_2+m+n)	72832	68711	88443.68	64750.75	85.75	86.77	60.46	34.3
o.Imputed value of family labour	12108	10480	57844.10	124238.10	14.25	13.23	39.54	65.7
Cost C (Cost B+o)	84940	79191	146287.77	188988.85	100	100	100	100

5.20 In Jammu & Kashmir total cost of cultivation of capsicum was Rs. 79191 per hectare. The material cost, being the major cost component, constituted 31.88 percent of the total cost followed by labour cost i.e. 33.05 percent and rental value of owned land 31.87 percent in

overall. The share of manure was observed to be 11.36 percent followed by fertilizer (7.54%), insecticides & pesticides (6.98%) and seed/seedlings (6%). The bullock labour was 5.30 percent of the cost C. The amount incurred on depreciation, land revenue, interest on working and fixed capital was found to be 0.28, 0.02, 1.55 and 1.34 percent respectively.

5.21 In Uttarakhand total cost of cultivation of capsicum was Rs. 146287.77 per hectare on all the sampled farms. The labour cost, being the major cost component, constituted 49.49 percent of the total cost followed by rental value of owned land 21.27 percent and material cost i.e. 20.37 percent. The share of seed/seedling was observed to be 9.75 percent followed by of manure (4.92%) fertilizer (3.27%) and insecticides & pesticides (2.43%). The bullock labour was 4.67 percent of the cost C. The amount incurred on depreciation, interest on working and fixed capital was 2.56, 0.91 and 3.12 percent respectively.

5.22 In Sikkim total cost of cultivation of capsicum was Rs. 188988.85 per hectare on all the sampled farms as given in Table 5.3. The human labour cost, being the major cost component, constituted 77percent of the total cost followed by material cost i.e. 19 percent. The share of seed/seedling was observed to be 15 percent followed by manure (4 %). The rental value of owned land and bullock labour was observed to be 3.50 and 1.80 percent of the cost C. The amount incurred on depreciation and interest on working capital was reported to be 0.20 and 0.30 percent respectively.

Cost of Cultivation of Beans

5.23 The cost of cultivation of beans among the sampled famers is given in Table 5.6. In Himachal Pradesh total cost of cultivation of beans was Rs. 83397 per hectare on all the sampled farms. The labour cost, being the major cost component, constituted 34.10 percent of the total cost followed by rental value of owned land i.e. 31.92 percent and material cost 30.99 percent in overall. The share of manure was observed to be 11.20 percent followed by that of seed/seedlings (6.91%), fertilizer (6.88%), insecticides and pesticides (6%). The bullock labour was 5.10 percent of the cost C. The amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.25, 0.02, 1.46 and 1.26 percent respectively.

5.24 In Uttarakhand total cost of cultivation of beans was Rs. 146447.47 per hectare on all the sampled farms. The labour cost, being the major cost component, constituted 53.21 percent of the total cost followed by rental value of owned land 20.89 percent and material cost i.e. 15.79 percent in overall. The share of manure was observed to be 5.77 percent followed by of

seed/seedling (5.04%), fertilizer (3.09%) and insecticides & pesticides (1.89%). The bullock labour was 4.25 percent of the cost C. On the whole, the amount incurred on depreciation, interest on working and fixed capital was 2.63, 0.84 and 3.11 percent respectively.

Table 5.6 Cost of Cultivation of Beans Among Sampled Farmers

Cost Components	Value in (Rs./ha.)				Percentage			
	H.P	J&K	Uttarakhand	Sikkim	H.P	J&K	Uttarakhand	Sikkim
a.Human Labour (Hired)	10370		11514.73	19068.40	12.44		7.86	12.8
b. Bullock Labour	4238		6220.50	3537.73	5.10		4.25	2.4
c.Seed/Seedlings	5758		7386.66	17139.03	6.91		5.04	11.5
d.Manure	9403		8452.52	5270.58	11.20		5.77	3.5
e.Fertilizer	5737		4532.39	0.00	6.88		3.09	0.0
f.Insecticides and pesticides	5004		2766.90	0.00	6.00		1.89	0.0
g.Sticks	0		0.00	0.00	0		0.00	0.0
h.Depreciation (Implements and farm building)	211		3855.72	490.15	0.25		2.63	0.3
i.Land Revenue and taxes	18		0.00	0.00	0.02		0.00	0.0
j.Interest on working capital	1215		1226.21	414.78	1.46		0.84	0.3
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)	0		2044.97	0.00	0		1.40	0.0
Total (Cost A_1)	41954		48000.59	45920.68	50.25		32.78	30.8
l.Rent paid for leased in land	0		3098.43	471.70	0		2.12	0.3
Cost A_2 (Cost A_1+l)	41954		51099.02	46392.38	50.25		34.89	31.1
m.Rental value of owned land	26602		30597.02	6567.80	31.92		20.89	4.3
n.Interest on fixed capital (excluding land)	1048		4558.90	0.00	1.26		3.11	0.0
Cost B (Cost A_2+m+n)	69604		86254.94	52836.25	83.44		58.90	35.4
o.Imputed value of family labour	13793		60192.52	96445.55	16.56		41.10	64.6
Cost C (Cost B+o)	83397		146447.47	149281.83	100		100	100

5.25 In Sikkim total cost of cultivation of beans was Rs. 149281.83 per hectare on all the sampled farms as given in Table 5.6. The human labour cost, being the major cost component, constituted 77.40 percent of the total cost followed by material cost i.e. 15.00 percent in overall. The share of seed/seedling was observed to be 11.50 percent followed by manure (3.50%). The rental value of owned land and bullock labour was observed to be 4.30 and 2.40 percent of the cost C. Amount incurred on depreciation and interest on working capital was 0.30 percent for each of the constituent respectively.

Cost of Cultivation of Knolkhol

5.26 The cost of cultivation of Knolkhol among the sampled famers is given in Table 5.7. In Jammu & Kashmir .Total cost of cultivation of Knolkhol was estimated to be Rs. 89407 per hectare for all the sampled farms.

The material cost, being the major cost component, constituted 34.89 percent of the total cost followed by labour cost i.e. 34.11 percent and rental value of owned land 27.83 percent in overall. The share of manure was observed to be 14.10 percent followed by seed/seedlings (7.25%), insecticides & pesticides (7.22%) and fertilizer (6.32%). The bullock labour was 5.52 percent of the cost C. Amount incurred on depreciation, land revenue, interest on working and fixed capital was 0.28, 0.02, 1.63 and 1.25 percent as reported by the farmers.

Table 5.7 Cost of Cultivation of Knolkhol Among Sampled Farmers

Cost Components	**Value in (Rs./ha.)**				**Percentage**			
	H.P	J&K	Uttara khand	Sikki m	H.P	J&K	Uttarakh and	Sikkim
a.Human Labour (Hired)		12365				13.83		
b. Bullock Labour		4934				5.52		
c.Seed/Seedlings		6478				7.25		
d.Manure		12602				14.10		
e.Fertilizer		5654				6.32		
f.Insecticides and pesticides		6457				7.22		
g.Sticks		0				0		
h.Depreciation (Implements and farm building)		247				0.28		
i.Land Revenue and taxes		15				0.02		
j.Interest on working capital		1455				1.63		
k.Miscellaneous expenditure (Machinery,water,elect. Charges etc.)		0				0		
Total (Cost A_1)		50207				56.16		
l.Rent paid for leased in land		0				0		
Cost A_2 (Cost A_1+l)		50207				56.16		
m.Rental value of owned land		24885				27.83		
n.Interest on fixed capital (excluding land)		1115				1.25		
Cost B (Cost A_2+m+n)		76207				85.24		
o.Imputed value of family labour		13201				14.76		
Cost C (Cost B+o)		89407				100		

Input-Output Analysis

5.27 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 Tomato Crop

5.28 The gross as well as net returns from the production of tomato on sampled farms of selected areas are presented in Table 5.8. In Himachal Pradesh the per hectare net returns over cost of A, A_1, B and C in cultivation of tomato was found to be Rs. 546034, Rs. 546034, Rs. 518986, and Rs. 502939 respectively.

5.29 In Jammu & Kashmir per hectare net returns over cost A, A_1, B and C in cultivation of tomato was Rs. 421987, Rs. 421987, Rs. 415040, and Rs. 402666 and in Uttarakhand per hectare net returns over cost of A, A_1, B and C in cultivation of tomato was Rs. 364475, Rs. 362627, Rs. 326194, and Rs. 247120. In Sikkim per hectare net returns over cost A, A_1, B and C in cultivation of tomato was Rs. 861439, Rs. 861000, Rs. 844548, and Rs. 725976 respectively.

Table 5.8 Input-output Analysis in Tomato Production

(Rs./hectare)

Particulars	H.P	J&K	Uttarakhand	Sikkim
Cost A_1	57604	73846	71206	69886.83
Cost A_2	57604	73846	73054	70325.43
Cost B	84652	80793	109487	76778.00
Cost C	96517	93167	188560	205349.80
Gross returns	603638	495833	435680	931326.10
Net returns over				
Cost A_1	546034	421987	364475	861439.30
Cost A_2	546034	421987	362627	861000.70
Cost B	518986	415040	326194	854548.10
Cost C	507121	402666	247120	725976.30

Returns from Cultivation of Peas Crop

5.30 The gross returns and net returns from the production peas on sampled farms of selected areas are viz; Himachal Pradesh, Uttarakhand and Sikkim are presented in Table 5.9. It is found that in Himachal Pradesh the per hectare net returns over cost A, A_1, B and C in the cultivation of peas was Rs. 338541, Rs. 338541, Rs. 311468, and Rs. 299160 respectively.

5.31 In Uttarakhand per hectare net returns over cost A, A_1, B and C in the cultivation of peas was Rs. 385218, Rs. 385125, Rs. 346978, and Rs. 282763 respectively. In Sikkim the per hectare net returns over cost A, A_1, B and C in the cultivation of peas was Rs. 319283.50, Rs. 319283.50, Rs. 312715.70 and Rs. 212150 respectively.

Table 5.9 Input-output Analysis in Peas Production

(Rs./hectare)

Particulars	H.P	J&K	Uttarakhand	Sikkim
Cost A_1	48608	-	50462	34116.23
Cost A_2	48608	-	50555	34116.23
Cost B	75681	-	88703	40684.03
Cost C	87989	-	152918	141249.70
Gross returns	387149	-	435680	353399.70
Net returns over		-		
Cost A_1	338541	-	385218	319283.50
Cost A_2	338541	-	385125	319283.50
Cost B	311468	-	346978	312715.70
Cost C	299160	-	282763	212150.00

Returns from Cultivation of Cabbage Crop

5.32 The gross returns and net returns from the production of cabbage on sampled farms of selected areas viz; Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim are presented in Table 5.10. It is found that in Himachal Pradesh the per hectare net returns over cost A, A_1, B and C in the cultivation of cabbage was Rs. 440977, Rs. 440977, Rs. 414307 and Rs. 401687 respectively.

Table 5.10 Input-output Analysis in Cabbage Production

(Rs./hectare)

Particulars	H.P	J&K	Uttarakhand	Sikkim
Cost A_1	54440	51265	60946	45596.33
Cost A_2	54440	51265	60946	46020.08
Cost B	81110	77817	99220	52476.55
Cost C	93730	88974	157550	153238.38
Gross returns	495417	382575	328265	516495.10
Net returns over				
Cost A_1	440977	331310	267320	470898.78
Cost A_2	440977	331310	267320	470475.05
Cost B	414307	304758	229046	464018.55
Cost C	401687	293601	170715	363256.73

5.33 In Jammu & Kashmir the per hectare net returns over cost A_1, A_2, B and C in the cultivation of cabbage was Rs. 331310, Rs. 331310, Rs. 304758, and Rs. 293601. Whereas In Uttarakhand these values were Rs. 267320, Rs. 267320, Rs. 229046, and Rs. 170715 respectively.

5.34 In Sikkim the per hectare net returns over cost A_1, A_2, B and C in the cultivation of cabbage was found to be Rs. 470898.78, Rs. 470475.05, Rs. 464018.55, and Rs. 363256.73 respectively.

Returns from Cultivation of Cauliflower Crop

5.35 The gross returns and net returns from the production cauliflower on sampled farms of selected areas viz; Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim are presented in Table 5.11. In Himachal Pradesh the per hectare net returns over cost A_1, A_2, B and C in the cultivation of cauliflower found to be Rs. 497452, Rs. 497452, Rs. 469842 and Rs. 456818 respectively.

Table 5.11 Input-Output Analysis in Cauliflower Production

(Rs./hectare)

Particulars	H.P	J&K	Uttarakhand	Sikkim
Cost A_1	61553	58052	50855	38984.65
Cost A_2	61553	58052	52062	39408.38
Cost B	89163	84891	89117	45864.88
Cost C	102187	95350	149223	108486.68
Gross returns	559005	515929	420750	654828.65
Net returns over				
Cost A_1	497452	457877	369895	615844.00
Cost A_2	497452	457877	368688	615420.28
Cost B	469842	431038	331633	608963.80
Cost C	456818	420579	271527	546341.98

5.36 In Jammu & Kashmir per hectare net returns over cost A_1, A_2, B and C in the cultivation of cauliflower was Rs. 457877, Rs. 457877, Rs. 431038, and Rs. 420579, whereas in Uttarakhand these values are reported as Rs. 369895, Rs. 368688, Rs. 331633, and Rs. 271527 respectively. In Sikkim per hectare net returns over cost A_1, A_2, B and C in the cultivation of cauliflower were Rs. 615844.00, Rs. 615420.28, Rs. 608963.80, and Rs. 546341.98 respectively.

Returns from Cultivation of Capsicum Crop

5.37 The gross returns and net returns from the production capsicum on sampled farms of selected areas viz; Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim are presented in Table 5.12. In Himachal Pradesh the per hectare net returns over cost A_1, A_2, B and C in the cultivation of capsicum was Rs. 307234, Rs. 307234, Rs. 280738 and Rs. 268630 respectively.

5.38 In Jammu & Kashmir the per hectare net returns over cost A_1, A_2, B and C in the cultivation of cauliflower was Rs. 496587, Rs. 496587, Rs. 470289, and Rs. 459809 respectively. In Uttarakhand per hectare net returns over cost A_1, A_2, B and C in the cultivation of cauliflower were Rs. 372895, Rs. 370312, Rs. 334630, and Rs. 276786, whereas in Sikkim the per hectare net returns over cost A_1, A_2, B and C in the cultivation of cauliflower were found to be Rs. 2232323.80, Rs. 2232323.80, Rs. 2225756.00, and Rs. 2101517.90 respectively.

Table 5.12 Input-output Analysis in Capsicum Production

(Rs./hectare)

Particulars	H.P	J&K	Uttarakhand	Sikkim
Cost A_1	46336	42413	50180	58182.98
Cost A_2	46336	42413	52762	58182.98
Cost B	72832	68711	88444	64750.75
Cost C	84940	79191	146288	188988.85
Gross returns	353570	539000	423074	2290506.75
Net returns over				
Cost A_1	307234	496587	372895	2232323.80
Cost A_2	307234	496587	370312	2232323.80
Cost B	280738	470289	334630	2225756.00
Cost C	268630	459809	276786	2101517.90

Returns from Cultivation of Beans Crop

5.39 The gross returns and net returns from the production beans on sampled farms of selected areas are presented in Table 5.13. It was estimated that in Himachal Pradesh per hectare net returns over cost A_1, A_2, B and C in the cultivation of beans were Rs. 237746, Rs. 237746, Rs. 210098 and Rs. 196296.

Table 5.13 Input-Output Analysis in Beans Production

(Rs./hectare)

Particulars	H.P	J&K	Uttarakhand	Sikkim
Cost A_1	41872		48001	45920.68
Cost A_2	41872		51099	46392.38
Cost B	69520		86255	52836.25
Cost C	83322		146447	149281.83
Gross returns	279618		373366	416441.03
Net returns over				
Cost A_1	237746		325366	370520.35
Cost A_2	237746		322267	370048.65
Cost B	210098		287112	363604.78
Cost C	196296		226919	267159.20

5.40 In Uttarakhand per hectare net returns over cost A_1, A_2, B and C in the cultivation of beans were found to be Rs. 325366, Rs. 322267, Rs. 287112, and Rs. 226919. In Sikkim per hectare net returns over cost A_1, A_2, B and C in the cultivation of beans were estimated to be as Rs. 370520.35, Rs. 370048.65, Rs. 363604.78, and Rs. 267159.20 respectively.

Returns from Cultivation of Knolkhol Crop

5.41 The gross returns and net returns from the production of knolkhol on sampled farms of selected areas are presented in Table 5.14.

Table 5.14 Input-Output Analysis in Knolkhol Production

(Rs./hectare)

Particulars	H.P	J&K	Uttarakhand	Sikkim
Cost A_1		50207		
Cost A_2		50207		
Cost B		76207		
Cost C		89407		
Gross returns		520000		
Net returns over				
Cost A_1		469793		
Cost A_2		469793		
Cost B		443793		
Cost C		430593		

The data in the Table shows that in Jammu & Kashmir the per hectare net returns over cost A_1, A_2, B and C in the cultivation of beans were Rs. 469793, Rs. 469793, Rs. 443793 and Rs. 430593 respectively.

Input-Output Ratio

5.42 To examine the production efficiency of various vegetables, input-output ratios have been worked out and are presented in Table 5.15. It is the ratio of output to inputs used in the production process, i.e. output per unit of input. The data in the table represent gross returns over cost C for per rupee investment on selected off season vegetables.

Table 5.15 Input-Output Ratio in Various Vegetables Production among Sampled Farmers

State	Vegetables						
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans	Knolkhol
H.P	6.25	4.40	5.29	5.47	4.11	3.35	-
J&K	5.32		4.30	5.41	6.80		5.82
Uttarakhand	2.31	2.16	2.08	2.82	2.89	2.55	-
Sikkim	1.28	1.67	1.42	1.20	1.09	1.56	-

5.43 The data in the Table depicts that in Himachal Pradesh tomato cultivation is more profitable followed by cauliflower, cabbage, peas, capsicum and beans, whereas in Jammu & Kashmir capsicum cultivation is more profitable followed by knolkhol, cauliflower, tomato and cabbage. In Uttarakhand cultivation of capsicum was also more profitable followed by cauliflower, beans, tomato, peas and cabbage. In Sikkim cultivation of peas was more profitable followed by beans, cabbage, tomato, cabbage and capsicum.

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 being 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. Per farm production of vegetables and the proportion of the produce retained for different purposes by the sampled households under study are given in Table 6.1.

6.3 In Himachal Pradesh, on an average per farm production of tomato was observed to be 53.66 quintals. The proportionate share of the quantity marketed was highest (93.41%) followed losses (6.23%) and home consumption (0.36%).

6.4 In Jammu & Kashmir the per farm average production of tomato was reported to be 35.47 quintals, quantity marketed was highest (94.90%) followed by losses (3.71%) and home consumption (1.39%). In Uttarakhand per farm average production of tomato was 20.48 quintals out of which 93.97% was being marketed followed by home consumption (2.70%), losses (2.47%) and quantity given as kind wages (0.86%). In Sikkim per farm average production of tomato was 8.80 quintals. The proportionate share of the quantity marketed was highest (95.23%) followed by home consumption.

Table 6.1 Utilization Pattern of Different Vegetables among Sampled Farmers

(Percentages)

Particulars	Total production (Qtls.)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
Tomato						
H.P	53.66	0.36	0	0	6.23	93.41
J&K	35.47	1.39	0	0	3.71	94.90
Uttrakhand	20.48	2.70	0.86	0.00	2.47	93.97
Sikkim	8.80	3.30	0.00	0.00	0.00	95.23
Peas						
H.P	37.36	0.84	0	0	2.83	96.33
J&K						
Uttrakhand	16.55	3.60	1.46	0.02	2.63	92.28
Sikkim	4.37	3.43	0.00	0.46	0.00	96.34
Cabbage						
H.P	79.27	0.39	0	0	5.60	94.01
J&K	48.96	13.30	0	0	8.92	77.78
Uttrakhand	24.86	2.78	0.86	0.00	2.11	94.26
Sikkim	11.43	1.57	0.00	0.00	0.00	98.43
Cauliflower						
H.P	79.65	0.46	0	0	7.85	91.69
J&K	49.77	6.80	0	0	7.23	85.98
Uttrakhand	15.46	3.28	1.19	0.00	2.33	93.21
Sikkim	10.18	1.77	0.00	0.00	0.00	98.23
Capsicum						
H.P	28.62	0.91	0	0	5.45	93.64
J&K	37.02	2.10	0	0	2.85	95.05
Uttrakhand	8.67	5.17	1.67	0.00	1.94	91.22
Sikkim	16.72	0.72	0.00	0.00	0.00	99.28
Beans						
H.P	31.98	0.89	0	0	4.64	94.47
J&K						
Uttrakhand	6.00	5.62	2.63	0.00	1.93	89.82
Sikkim	4.58	5.57	0.00	0.22	0.00	96.66
Knolkhol						
H.P						
J&K	58.69	2.86	0	0	4.63	92.51
Uttrakhand						
Sikkim						

6.5 In Himachal Pradesh per farm average production of peas was estimated to be 37.36 quintals. Out of which the quantity marketed was highest (96.33%) followed by losses (2.83%) and home consumption (0.84%). In Uttarakhand per farm average production of peas was observed to be 16.55 quintals and the proportionate share of the quantity marketed was highest (92.28%) followed by home consumption (3.60%), losses (2.63%) quantity given as kind wages (1.46%) and retained as seeds (0.02%). It is found that in Sikkim per farm average production of peas was 4.37 quintals and quantity marketed was highest (96.34%) followed by home consumption (3.43%).

6.6 In Himachal Pradesh per farm average production of cabbage was observed to be 79.27 quintals out of which quantity marketed was highest (94.01%) followed by losses (5.60%) and home consumption (0.39%). While in Jammu & Kashmir per farm average production of cabbage was estimated to be 48.96 quintals and quantities marketed was highest (77.78%) followed by home consumption (13.30%) and losses (3.71%). In Uttarakhand per farm average production of cabbage was reported to be 24.86 quintals. The proportionate share of the quantity marketed was highest (94.26%) followed by home consumption (2.78%), losses (2.11%) and quantity given as kind wages (0.86%). In Sikkim per farm average production of cabbage was observed to be 11.43 quintals, quantity marketed was highest (98.43%) followed by home consumption.

6.7 In Himachal Pradesh per farm average production of cauliflower was observed to be 79.65 quintals out of which 91.69% was marketed and losses and home consumption recorded as 785% and 0.46% respectively. While in Jammu & Kashmir per farm average production of cauliflower was estimated to be 49.77 quintals and out of which 85.98% of the produce are being marketed followed by losses (7.23%) and home consumption (6.80%). In Uttarakhand per farm average production of cauliflower was reported to be 15.46 quintals. The proportionate share of the quantity marketed was highest (94.26%) followed by home consumption (3.28%), losses (2.33%) and quantity given as a kind of wages (1.19%). In Sikkim per farm average production of cauliflower was estimated to be 10.18 quintals out of that quantity marketed was highest (98.23%) followed by home consumption.

6.8 In Himachal Pradesh per farm average production of capsicum was estimated to be 28.62 quintals. Quantity marketed was highest (93.64%) followed by losses (5.45%) and home consumption (0.91%). In Jammu & Kashmir per farm average production of capsicum was reported to be 37.02 quintals out of which 95.05% of the total product marketed and losses and home consumption were 2.85%) &2.10% respectively. In Uttarakhand per farm average

production of capsicum was observed to be 8.67 quintals. The proportionate share of the quantity marketed was highest (91.22%) followed by home consumption (5.17%), losses (1.94%) and quantity given as a kind of wages (1.67%). In Sikkim per farm average production of capsicum was reported to be 16.72 quintals. Quantity marketed was highest (99.28%) followed by home consumption (0.72%).

6.9 In Himachal Pradesh per farm average production of beans was reported to be 31.98 quintals out of which quantity marketed was highest (94.47%) followed by losses (4.64%) and home consumption (0.89%). In Uttarakhand per farm average production of beans was observed to be 6.00 quintals. Out of which the proportionate share of the quantity marketed was highest (89.82%) followed by home consumption (5.62%) quantity given as kind wages (2.63) and losses (1.93%). In Sikkim per farm average production of beans was estimated to be 4.58 quintals. Quantity marketed was highest (96.66%) followed by home consumption (5.57%) and quantity retain as seeds.

6.10 In Jammu & Kashmir per farm average production of knolkhol was estimated to be 58.69 quintals. The proportionate share of the quantity marketed was highest (92.51%) followed by losses (4.63%) and home consumption (2.86%).

Markets for Vegetable Crops

6.11 The quantity of produce actually marketed depends upon the marketable surplus, immediate need for cash, price trend, and nature of crops and availability of the storage facilities. The off season vegetables produced by the sampled farmers are supplied to the local and nearby markets. The proportion of different vegetables sold in local and others market is given in Table 6.2.

6.12 In Himachal Pradesh almost 22 percent of the saleable tomato was sold in local markets and 78 percent quantity in Chandigarh market. In Jammu & Kashmir 79.25 percent quantity was sold in local markets and rest in Jammu market. In Uttarakhand 28 percent of the commodity was sold in Haldwani market and 72 percent in Vikas Nagar market. In Sikkim 100 per cent of the vendible commodity was sold in the local markets.

6.13 In Himachal Pradesh, almost 23 percent of marketable peas was sold in local markets and 77 percent quantity in Chandigarh market. The Table further illustrates that in Uttarakhand 44 percent of the quantity was sold in Haldwani market and 56 percent in Vikas Nagar market. In Sikkim 100 per cent of the commodity sold in the local markets.

Table 6.2 Quantity of Different Vegetables Marketed to Different Markets by Sampled Farmers

(**Qtls./farm)**

Particulars	Total marketed	Marketed in the village	Marketed in local market	Marketed in market 1 (Chandigarh Jammu, Haldwani Market)	Marketed in market 2 (Vikas Nagar Market)
Tomato					
H.P	50.12 (100.0)	0	10.82 (21.59)	39.30 (78.41)	0
J&K	33.66 (100.0)	0	26.68 (79.25)	6.98 (20.75)	0
Uttrakhand	33.55 (100)	0	0	9.55 (28)	24.00 (72)
Sikkim	8.51 (100)	0.00	8.51 (100)	0.00	0.00
Peas					
H.P	35.99 (100.0)	0	8.26 (22.94)	27.73 (77.06)	0
J&K					
Uttrakhand	32.97 (100)	0	0	14.45 (44)	18.52 (56)
Sikkim	6.22 (100)	0.00	6.22 (100)	0.00	0.00
Cabbage					
H.P	74.52 (100.0)	0	18.98 (25.47)	55.54 (74.53)	0
J&K	38.08 (100.0)	0	8.53 (77.60)	29.55 (22.40)	0
Uttrakhand	38.11 (100)	0	0	27.19 (71)	10.92 (29)
Sikkim	11.27 (100)	0.00	11.27 (100)	0.00	0.00
Cauliflower					

H.P	74.01 (100.0)	0	19.47 (26.31)	53.57 (72.38)	0
J&K	42.79 (100.0)	0	34.82 (81.37)	7.97 (18.63)	0
Uttrakhand	30.62 (100)	0	0	16.00 (52)	14.62 (48)
Sikkim	10.07 (100)	0.00	10.07 (100)	0.00	0.00
Capsicum					
H.P	26.85 (100.0)	0	6.06 (22.58)	20.12 (77.42)	0
J&K	35.18 (100.0)	0	26.74 (76.00)	8.44 (24.00)	0
Uttrakhand	15.08 (100)	0	0	5.86 (39)	9.22 (61)
Sikkim	16.92 (100)	0.00	16.92 (100)	0.00	0.00
Beans					
H.P	30.21 (100.0)	0	7.32 (24.24)	22.90 (75.76)	0
J&K					
Uttrakhand	11.05 (100)	0	0	5.14 (47)	5.91 (53)
Sikkim	4.30 (100)	0.00	4.30 (100)	0.00	0.00
Knolkhol					
H.P					
J&K	54.29 (100.0)	0	42.35 (78.00)	11.94 (22.00)	0
Uttrakhand					
Sikkim					

6.14 It has been noticed that in Himachal Pradesh almost 25 percent of the vendible cabbage are sold in the local markets and 75 percent quantity in Chandigarh market. While in Jammu & Kashmir 78 percent of the vendible commodity was sold in local markets and 22 percent quantity in Jammu market. In Uttarakhand 71 percent quantity was sold in Haldwani market and

rest 29 percent in Vikas Nagar market. In Sikkim 100 per cent of the quantity was sold in local market.

6.15 It has been estimated that in Himachal Pradesh 26.31 percent of the saleable cauliflower was marketed in the local markets and 72.38 percent quantity in Chandigarh market. It is further noticed that in Jammu & Kashmir 81.37 percent of the saleable quantity was sold in local markets and rest 18.63 percent quantity in Jammu market. In Uttarakhand 52 percent quantity was marketed in Haldwani market and rest in Vikas Nagar market. While in Sikkim 100 per cent of the marketable quantity was sold in local market.

6.16 It is found that in Himachal Pradesh 22.58 percent of marketable capsicum was sold in the local markets and 77.42 percent in Chandigarh market. While in Jammu & Kashmir 76 percent was sold in local markets and rest 24 percent in Jammu market. In Uttarakhand 39 percent of the commodity was sold in Haldwani market and rest in Vikas Nagar market. In Sikkim 100 per cent of the marketable quantity was sold in local the markets.

6.17 In Himachal Pradesh 24.24 percent of the beans was sold in local markets and 75.76 percent quantity in Chandigarh market. In Uttarakhand 47 percent of saleable beans was sold in Haldwani market and 53 percent quantity in Vikas Nagar market. While in Sikkim 100 per cent of the marketable quantity was sold in local market.

6.18 In Jammu & Kashmir 78 percent of marketable knolkhol was sold in local markets and rest 22 percent in Jammu market.

Losses in Vegetables

6.19 Physical characteristics of 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 affecting yield and economics of cultivation. The producers had to bear the losses at the time of grading and en-route transportation. The percentages of losses in respect of all six vegetables are given above in Tables 6.3. Now in the next two Tables, the extent of losses at various levels viz field, picking/assembling, grading, packing and transportation are evaluated for all the sampled farms.

Table 6.3 Losses in Vegetables up to the Market on Sampled Farms

(Qtls./farm)

Particulars	States (***Qtls./farm)***				*Percent to total production)*			
	H.P	J&K	Uttrakhand	Sikkim	H.P	J&K	Uttrakhand	Sikkim
Tomato								
-Due to natural calamities	1.96	0.93	0.18	.0000	3.65	2.63	0.87	0.00
-Due to disease & pest			0.13				0.66	
-.At the time of picking/assembling	1.08	0.25	0.09	.1354	2.02	0.69	0.43	1.54
-Grading and packing	0.30	0.14	0.06	.0308	0.56	0.39	0.29	0.35
-.Field to road head	0	0	0.02	.0583	0	0	0.09	0.66
-.Road head to market	0	0	0.02	.1056	0	0	0.08	1.20
-Market and Storage			0.01				0.05	
-Total losses	3.34	1.32	0.51	.3302	6.23	3.71	2.47	3.75
Peas								
-Due to natural calamities	0.68	0	0.18	.0000	1.82	0	1.08	0.00
-Due to disease & pest			0.15				0.90	
-.At the time of picking/assembling	0.24	0	0.05	.0270	0.65	0	0.29	0.61
-Grading and packing	0.13	0	0.02	.0096	0.36	0	0.14	0.22
-.Field to road head	0	0	0.01	.0171	0	0	0.08	0.38
-.Road head to market	0	0	0.02	.0358	0	0	0.13	0.80
-Market and Storage			0.00				0.01	
-Total losses	1.06	0	0.44	.0894	2.83	0	2.63	2.01
Cabbage								
-Due to natural calamities	2.67	2.80	0.21	.0000	3.36	5.72	0.85	0.00
-Due to disease & pest			0.16				0.64	
-.At the time of picking/assembling	1.30	1.04	0.08	.0944	1.64	2.13	0.31	0.82
-Grading and packing	0.48	0.52	0.05	.0406	0.60	1.06	0.18	0.35
-.Field to road head	0	0	0.01	.0467	0	0	0.04	0.41
-.Road head to market	0	0	0.01	.0715	0	0	0.04	0.62
-Market and Storage			0.01				0.03	
-Total losses	4.44	4.36	0.52	.2532	5.60	8.92	2.11	2.20
Cauliflower								
-Due to natural calamities	3.92	2.55	0.13	.0000	4.92	5.12	0.86	0.00
-Due to disease & pest			0.11				0.70	
-.At the time of picking/assembling	1.60	0.62	0.06	.0793	2.01	1.25	0.39	0.78
-Grading and packing	0.73	0.43	0.03	.0420	0.92	0.86	0.20	0.41
-.Field to road head	0	0	0.01	.0296	0	0	0.05	0.29
-.Road head to market	0	0	0.01	.0936	0	0	0.09	0.92
-Market and Storage			0.00				0.03	
-Total losses	6.25	3.60	0.36	.2444	7.85	7.23	2.33	2.41

Capsicum								
-Due to natural calamities	0.98	0.70	0.05	.0000	3.41	1.89	0.58	0.00
-Due to disease & pest			0.04				0.51	
-.At the time of picking/assembling	0.39	0.31	0.03	.1028	1.37	0.83	0.33	0.62
-Grading and packing	0.19	0.05	0.03	.0478	0.67	0.14	0.35	0.29
-.Field to road head	0	0	0.01	.0454	0	0	0.08	0.27
-.Road head to market	0	0	0.00	.3056	0	0	0.05	1.84
-Market and Storage			0.00				0.05	
-Total losses	1.56	1.06	0.17	.5016	5.45	2.85	1.94	3.01
Beans								
-Due to natural calamities	0.95		0.00	.0000	2.98		0.00	0.00
-Due to disease & pest			0.03				0.51	
-.At the time of picking/assembling	0.40		0.04	.0210	1.25		0.67	0.46
-Grading and packing	0.13		0.03	.0129	0.42		0.53	0.28
-.Field to road head	0		0.01	.0208	0		0.11	0.45
-.Road head to market	0		0.00	.0146	0		0.04	0.32
-Market and Storage			0.00				0.06	
-Total losses	1.49		0.12	.0694	4.64		1.93	1.51
Knokhol								
-Due to natural calamities		1.82				3.10		
-Due to disease & pest								
-.At the time of picking/assembling		0.53				0.91		
-Grading and packing		0.36				0.61		
-.Field to road head		0				0		
-.Road head to market		0				0		
-Market and Storage								
-Total losses		2.71				4.62		

6.20 In Himachal Pradesh maximum losses of tomato are found due to natural calamities i.e. 3.65 percent of the total production followed by losses during picking/assembling (2.02%) and losses at the time of grading and packing (0.56%). No losses were observed during transportation from field to road head and from road head to market. In Jammu & Kashmir maximum losses were found due to natural calamities as well i.e. 2.63 percent followed by picking/assembling (0.69%) and losses during grading and packing .No losses were observed in transportation from field to road head and from road head to market. In Uttarakhand looses estimated to be 0.87 percent by natural calamities followed by diseases & pests (0.66%), time of picking/assembling (0.43%), grading and packing (0.29%), field to road head (0.09%), road head to market (0.08%) and market & storage (0.05%). While in Sikkim maximum losses were

reported at the time of picking/assembling. Losses during transportation from road head to market (1.20%), field to road head (0.66%) and grading & packing are estimated to be 0.35% respectively.

6.21 Natural calamities play an important role in damaging peas production in Himachal Pradesh. It is estimated that 1.82 percent of total production are damaged by this cause followed by picking/assembling (0.65%), grading and packing (0.36%). No losses were observed in transportation from field to road head and from road head to market. In Uttarakhand maximum losses were also due to natural calamities i.e. 1.08 percent followed by diseases & pests (0.90%), picking/assembling (0.29%), grading and packing (0.14%), road head to market (0.13%), field to road head (0.08%) and market & storage (0.01%). While in Sikkim maximum losses were reported during transportation from road head to market followed by picking/assembling (0.61%), transportation during field to road head (0.38%) and grading & packing respectively.

Cabbage

6.22 In Himachal Pradesh 3.36 percent of the total cabbage production are estimated to be damaged by natural calamities, followed picking/assembling (1.64%), grading and packing (0.60%). No losses were observed in transportation from field to road head and from road head to market. In Jammu & Kashmir maximum losses were due to natural calamities and estimated to be 5.72 percent of the total losses followed by picking/assembling (2.13%), grading and packing No losses were found in transportation from field to road head and from road head to market. In Uttarakhand 0.85 percent losses of total production was reported due to natural calamities followed by diseases & pests ,picking/assembling (0.31%), grading and packing (0.18%), field to road head (0.04%), road head to market (0.04%) and market & storage (0.03%). While In Sikkim maximum losses were reported during the time of picking/assembling i.e. 0.82 percent followed by transportation from road head to market (0.62%) field to road head (0.41%) and grading & packing (0.35%) respectively.

6.23 In Himachal Pradesh maximum losses in cauliflower production were due to natural calamities i.e. 4.92 percent of the total production is found damaged due to this cause followed by picking/assembling (2.01%), grading and packing (0.92%). No losses were observed during transportation from field to road head and from road head to market. In Jammu & Kashmir 5.12 percent of the total production lost reported due to natural causes followed by losses during picking/assembling, grading and packing No losses were found during transportation from field

to road head and from road head to market. In Uttarakhand maximum losses were also due to natural calamities i.e. 0.86 percent followed by diseases & pests (0.70%), followed by picking/assembling (0.39%), grading and packing (0.20%), road head to market (0.09%), field to road head (0.05%) and market & storage (0.03%) respectively . In Sikkim maximum losses occurred during transportation from road head to market i.e. 0.92 percent followed by picking/assembling (0.78%), grading & packing (0.41%) and during transportation from field to road head.

6.24 In Himachal Pradesh maximum losses of capsicum production are reported due to natural calamities i.e. 3.41 percent followed by picking/assembling (1.37%) and grading and packing (0.67%). No losses were reported during transportation from field to road head and from road head to market. In Jammu & Kashmir maximum losses were due to natural calamities followed by losses at the time of picking/assembling (0.83%) and losses at the time of grading and packing (0.14%). In Uttarakhand maximum losses were found due to natural causes followed by diseases & pests, grading and packing, picking/assembling (0.33%), field to road head (0.08%), road head to market (0.05%) and market & storage (0.05%). While In Sikkim maximum losses are found during transportation from road head to market i.e. 1.84 percent followed by the losses at the time of picking/assembling (0.62%), grading & packing (0.29%) and during transportation from field to road head.

6.25 It is found that almost 2.98 percent of the beans total production in Himachal Pradesh was damaged due to natural calamities followed by during picking/assembling (1.25%) and losses at the time of grading and packing (0.42%). In Uttarakhand maximum losses were found duing picking/assembling followed by grading and packing (0.53%), diseases & pests (0.51%), field to road head (0.11%), road head to market (0.04%) and market & storage (0.06%) respectively. In Sikkim maximum losses were found at the time of picking/assembling i.e. 0.46 percent followed by the losses during transportation from road head to market (0.32%), grading & packing (0.29%) and during transportation from field to road head (0.28%) respectively.

6.26 In Jammu & Kashmir maximum losses of knolkhol were registered due to natural calamities i.e. 3.10 percent of the total production damaged due to this cause followed by losses at the time of picking/assembling (0.91, grading and packing (0.61%). No losses were observed during transportation from field to road head and from road head to market.

Producers' Share and Marketing Margin

6.27 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:

Himachal Pradesh Farmers

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

6.28 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 minimize the cost and understanding the nature and extent of marketing margins, the study of cost and price spread is essential.

6.29 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. Commission charged by the agent and market fees are 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.

6.30 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

Table 6.4(a) Producer's Share and Marketing Margin in Marketing of Vegetables (For Chandigarh Market)
Channel: Producer – Wholesaler – Commission Agent/Mashakhor–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/mashakhors						
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.Mashakhor's margin	24	49	24	28	33	38
6. Mashakhors' 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

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(b) Producer's 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

Jammu & Kashmir

Producer – Wholesaler – Commission Agent/Mashakhor – Retailer – Consumer.

6.31 The Table 6.4(c) shows the marketing costs and margin for tomato, cabbage, cauliflower, capsicum and knolkhol sold in Jammu market. It can be seen from this Table that the cost of marketing borne by vegetable growers for selling their produce in Jammu market worked out to be Rs.368, Rs.332, Rs.360, Rs.349 and Rs.353 per quintal for tomato, cabbage, cauliflower, capsicum and knolkhol. Transportation cost was the main component of total marketing cost borne by the producer for all the vegetables as markets are far away. The second important component of marketing cost was the cost of commission and market fee.

Table 6.4 (c) Producer's Share and Marketing Margin in Marketing of Vegetables (For Jammu Market)

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

(Rs./Qtls.)

Particulars	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Knolkhol
1.Net price received by growers	1771	-	1500	2000	2200	2000
2.Expenses incurred by growers						
i)Assembling, packing and grading	75	-	65	70	60	65
ii)Packing material	5	-	18	16	6	17
iii)Carriage upto road head	15	-	14	15	15	14
iv)Transportation upto market	145	-	145	145	145	145
v)Loading/unloading	10	-	10	10	10	10
vi)Commission & market fee	106	-	68	90	99	90
vii)State tax, octrio etc.	2	-	2	2	2	2
viii) Miscellaneous	10	-	10	12	12	10
Sub-Total	368	-	332	360	349	353
3. Wholesale price	2139	-	1832	2360	2549	2353
4. Expenses incurred by commission agent/mashakhors						
a)Carriage, handling etc.	55	-	53	52	52	53
b)Market fee & commission	204	-	150	200	231	200
Sub-Total	259	-	203	252	283	253
5.Mashakhors' margin	24	-	23	27	33	30
6. Mashakhors' sale price	2422	-	2058	2639	2865	2636
7.Retailers' Expenses						
Carriage & handling charges	20	-	22	23	20	22
Retailer losses	177	-	90	200	162	120
Sub-total	197	-	112	223	182	142
8.Retailers' margin	274	-	188	280	292	260
9.Consumers' price	2893	-	2358	3142	3339	3038

Table 6.4 (d) Producer's Share and Marketing Margin in Marketing Vegetables (For Jammu Market)

(Percentages)

Particulars	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Knolkhol
1.Net price received by growers	61.22	-	63.61	63.65	65.89	65.83
2.Expenses incurred by growers						
i)Assembling, packing and grading	2.59	-	2.76	2.23	1.80	2.14
ii)Packing material	0.17	-	0.76	0.51	0.18	0.56
iii)Carriage upto road head	0.52	-	0.59	0.48	0.45	0.46
iv)Transportation upto market	5.01	-	6.15	4.61	4.34	4.77
v)Loading/unloading	0.35	-	0.42	0.32	0.30	0.33
vi)Commission & market fee	3.66	-	2.88	2.86	2.96	2.96
vii)State tax, octrio etc.	0.07	-	0.08	0.06	0.06	0.07
viii) Miscellaneous	0.35	-	0.42	0.38	0.36	0.33
Sub-Total	12.72	-	14.08	11.46	10.45	11.62
3. Wholesale price	73.94	-	77.69	75.11	76.34	77.45
4. Expenses incurred by commission agent/mashakhors						
a)Carriage, handling etc.	1.90	-	2.25	1.65	1.56	1.74
b)Market fee & commission	7.05	-	6.36	6.37	6.92	6.58
Sub-Total	8.95	-	8.61	8.02	8.48	8.33
5.Mashakhors' margin	0.83	-	0.98	0.86	0.99	0.99
6. Mashakhors' sale price	83.72	-	87.28	83.99	85.80	86.77
7.Retailers' Expenses						
- Carriage & handling charges	0.69	-	0.93	0.73	0.60	0.72
- Retailer losses	6.12	-	3.82	6.37	4.85	3.95
Sub-total	6.81	-	4.75	7.10	5.45	4.67
8.Retailers' margin	9.47	-	7.97	8.91	8.75	8.56
9.Consumers' price	100.0	-	100.0	100.0	100	100

6.32 Producer's share in consumer's rupee and proportion of various costs and margins in various vegetables sold at Jammu are given in Table 6.4(d). This tables shows that the share of marketing costs in consumer's rupee was maximum in case of cabbage (14.08%) and minimum in capsicum (10.45%). The share of producer in consumer's rupee was 65.89, 65.83, 63.65, 63.61 and 61.22 percent in capsicum, knolkhol, cauliflower, cabbage and tomato respectively. The mashakhor's margins ranged between 0.83 percent in tomato to 0.99 percent each in capsicum and knolkhol. The retailer's margin was highest in tomato (9.47%) and lowest in cabbage (7.97%)

Uttarakhand

Producers' Share and Marketing Margin

6.33 The next four tables show price paid by the consumers actually reaches to the producers of these vegetables.

6.34 It can be seen from the Table 6.4 (e) that in Haldwani market net price received by the growers ranges between 33 per cent and 74 per cent for cabbage and capsicum growers. Usually they get as low as 33 per cent and 35 per cent of the consumers' price in comparison to French beans and peas growersas they get getting as high as 72 and 74 per cent of the price respectively. The whole sale prices for these vegetables ranges between 65 and 81 per cent of the consumer price. On the other hand table 6.4 (f) shows that this difference between the wholesale price and the consumer price is on account of Mashakors' and retailers' margin. While Mashakors' margin ranges between 7 and 13 per cent, retailers' margin can be as high as 22 per cent accordingly.

6.35 The situation is more precarious for those marketing their produce in Vikas Nagar market, as shown in tables 6.4 (g) and (h). For example, price paid for capsicum by the consumers is Rs 7056 per quintal but the net price received by the producer is only Rs 2231 per quintal. With producers receiving between 32 and 52 per cent of the consumer price there must be host of intermediaries in the entire chain.

Table 6.4 (e) Producer's Share and Marketing Margin in Marketing of Vegetables (For Haldwani Market)

(Rs./Qtl.)

Particulars	Tomato	Peas	Cabbage	Cauliflower	French beans	Capsicum
1.Net price received by growers	2250	4314	1512	2203	3651	2483
2.Expenses incurred by growers						
i)Assembling, packing and grading	301	298	270	293	310	336
ii)Packing material	57	53	39	42	43	77
iii)Carriage upto road head	22	34	46	69	20	23
iv)Transportation upto ……. market	59	87	54	78	113	100
v)Loading/unloading	11	8	7	11	12	13
vi)Commission & market fee	10	16	5	13	21	15
vii)State tax, octrio etc.	0	0	0	0	0	0
viii) Miscellaneous	0	0	0	2	0	3
Sub-Total	460	496	421	508	520	567
3. Wholesale price	3818	4700	3000	3063	4100	4900
4. Expenses incurred by commission agent/mashakhors						
a)Carriage, handling & transport etc.	120	50	40	107	75	117
b)Market fee & commission	0	0	0	0	0	0
Sub-Total	120	50	40	40	107	117
5.Mashakhors' margin	443	417	460	360	343	884
6. Mashakhors sale price	4382	5167	3500	3462.5	4550	5900
7.Retailers' Expenses						
-Carriage & handling charges	155	160	150	125	140	156
- Retailer losses	0	0	0	0	0	0
Sub-total	155	160	150	150	125	156
8.Retailers' margin	558	500	1000	533	425	1000
9.Consumers' price	5095	5827	4650	4146	5100	7056

Table 6.4 (f) Producer's Share and Marketing Margin in Marketing of Vegetables (For Haldwani Market)

(Percentage to total)

Particulars	Tomato	Peas	Cabbage	Cauliflower	French beans	Capsicum
1.Net price received by growers	44	74	33	53	72	35
2.Expenses incurred by growers	-	-	-	-	-	-
i)Assembling, packing and grading	6	5	6	7	6	5
ii)Packing material	1	1	1	1	1	1
iii)Carriage upto road head	0	1	1	2	0	0
iv)Transportation upto ……. market	1	1	1	2	2	1
v)Loading/unloading	0	0	0	0	0	0
vi)Commission & market fee	0	0	0	0	0	0
vii)State tax, octrio etc.	0	0	0	0	0	0
viii) Miscellaneous	0	0	0	0	0	0
Sub-Total	9	9	9	12	10	8
3. Wholesale price	75	81	65	74	80	69
4. Expenses incurred by commission agent/mashakhors	0	0	0	0	0	0
a)Carriage, handling etc.	2	1	1	3	1	2
b)Market fee & commission	0	0	0	0	0	0
Sub-Total	2	1	1	1	2	2
5.Mashakhors' margin	9	7	10	9	7	13
6. Mashakhors sale price	86	89	75	84	89	84
7.Retailers' Expenses						
- Carriage & handling charges	3	3	3	3	3	2
- Retailer losses	0	0	0	0	0	0
Sub-total	3	3	3	4	2	2
8.Retailers' margin	11	9	22	13	8	14
9.Consumers' price	100	100	100	100	100	100

Table 6.4 (g) Producer's Share and Marketing Margin in Marketing of Vegetables (For Vikas Nagar Market)

(Rs./Qtl.)

Particulars	Tomato	Peas	Cabbage	Cauliflower	French beans	Capsicum
1.Net price received by growers	2029	2612	1615	2143	2449	2231
2.Expenses incurred by growers						
i)Assembling, packing and grading	237	258	309	337	258	316
ii)Packing material	29	39	49	39	53	70
iii)Carriage upto road head	57	72	51	48	47	44
iv)Transportation upto …….. market	110	141	132	155	138	143
v)Loading/unloading	9	13	10	10	12	10
vi)Commission & market fee	9	11	9	33	89	27
vii)State tax, octrio etc.	0	0	0	0	0	0
viii) Miscellaneous	0	0	0	0	0	0
Sub-Total	450	535	560	622	596	610
3. Wholesale price	3818	4700	3000	3063	4100	4900
4. Commission agent's Expenses	0	0	0	0	0	0
a)Carriage, handling etc.	120	50	40	107	75	117
b)Market fee & commission	0	0	0	0	0	0
Sub-Total	120	50	40	40	107	117
5.Mashakhors' margin	443	417	460	360	343	884
6. Mashakhors sale price	4382	5167	3500	3463	4550	5900
7.Retailers' Expenses						
- Carriage & handling charges	155	160	150	125	140	156
- Retailer losses	0	0	0	0	0	0
Sub-total	155	160	150	150	125	156
8.Retailers' margin	558	500	1000	533	425	1000
9.Consumers' price	5095	5827	4650	4146	5100	7056

Table 6.4 (h) Producer's Share and Marketing Margin in Marketing of Vegetable (For Vikas Nagar Market)

(Percentage to total)

Particulars	Tomato	Peas	Cabbage	Cauliflower	French beans	Capsicum
1.Net price received by growers	40	45	35	52	48	32
2.Expenses incurred by growers	0	0	0	0	0	0
i)Assembling, packing and grading	5	4	7	8	5	4
ii)Packing material	1	1	1	1	1	1
iii)Carriage upto road head	1	1	1	1	1	1
iv)Transportation upto …… market	2	2	3	4	3	2
v)Loading/unloading	0	0	0	0	0	0
vi)Commission & market fee	0	0	0	1	2	0
vii)State tax, octrio etc.	0	0	0	0	0	0
viii) Miscellaneous	0	0	0	0	0	0
Sub-Total	9	9	12	15	12	9
3. Wholesale price	75	81	65	74	80	69
4. Expenses incurred by commission agent/mashakhors	0	0	0	0	0	0
a)Carriage, handling etc.	2	1	1	3	1	2
b)Market fee & commission	0	0	0	0	0	0
Sub-Total	2	1	1	1	2	2
5.Mashakhors' margin	9	7	10	9	7	13
6. Mashakhors sale price	86	89	75	84	89	84
7.Retailers' Expenses						
- Carriage & handling charges	3	3	3	3	3	2
- Retailer losses	0	0	0	0	0	0
Sub-total	3	3	3	4	2	2
8.Retailers' margin	11	9	22	13	8	14
9.Consumers' price	100	100	100	100	100	100

6.36 In case of producers' share in marketing of vegetables, it has stated earlier that in Sikkim, the state govt. partially shoulders the responsibility of marketing the vegetables through different kiosks, regulated markets, etc. under active supervision and monitoring. The vegetable growers market their products mostly through FPOs, either by themselves or by any other member of their SHGs or FPOs. The vegetable growers are themselves the retailers and there is little

Table 6.4 (i) Producer's Share and Marketing Margin in Marketing of Vegetables (Sikkim)

(Rs./Qtl.)

Particulars	Tomato	Peas	Cabbage	Cauliflower	Beans	Capsicum
1.Net price received by growers	3075.42	2965.71	1914.99	2767.34	3174.57	4586.75
2.Expenses incurred by growers	0.00	0.00	0.00	0.00	0.00	0.00
i)Assembling, packing and grading	176.82	135.55	120.77	136.53	124.29	141.78
ii)Packing material	7.75	53.55	4.09	4.71	3.72	1.15
iii)Carriage up to road head	79.65	83.07	24.59	22.56	80.49	83.78
iv)Transportation up to ……. market	84.87	78.69	65.13	56.71	69.94	85.61
v)Loading/unloading	30.10	31.08	18.28	19.41	30.79	31.70
vi)Commission & market fee	0.00	0.00	0.00	0.00	0.00	0.00
vii)State tax, octrio etc.	0.00	0.00	0.00	0.00	0.00	0.00
viii) Miscellaneous	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	379.20	381.94	232.86	239.92	309.23	344.02
3. Wholesale price	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
4. Expenses incurred by commission agent/mashakhors	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
a)Carriage, handling etc.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
b)Market fee & commission	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
5.Mashakhors' margin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
6. Mashakhors sale price	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
7.Retailers' Expenses	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
- Carriage & handling charges	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
- Retailer losses	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
8.Retailers' margin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
9.Consumers' price	3075.42	2965.71	1914.99	2767.34	3174.57	4586.75

N.A.: Not Applicable as FPOs shoulder the responsibility of marketing where the farmers are themselves retailers at times.

scope for middlemen to intermediate their transactions with wholesalers, which is clearly reflected here in Table 6.4 (i) and (j). Also to be noted here, under strict monitoring by the govt. bodies and their rules, there is no market fee, commission, tax, octroi, etc. in case of marketing of their vegetables for the vegetable growers.

Table 6.4 (j) Producer's Share and Marketing Margin in Marketing of Vegetables (Sikkim)

(Percentages)

Particulars	Tomato	Peas	Cabbage	Cauliflower	Beans	Capsicum
1.Net price received by growers	100.00	100.00	100.00	100.00	100.00	100.00
2.Expenses incurred by growers	0.00	0.00	0.00	0.00	0.00	0.00
i)Assembling, packing and grading	5.75	4.57	6.31	4.93	3.92	3.09
ii)Packing material	0.25	1.81	0.21	0.17	0.12	0.03
iii)Carriage up to road head	2.59	2.80	1.28	0.82	2.54	1.83
iv)Transportation up to …… market	2.76	2.65	3.40	2.05	2.20	1.87
v)Loading/unloading	0.98	1.05	0.95	0.70	0.97	0.69
vi)Commission & market fee	0.00	0.00	0.00	0.00	0.00	0.00
vii)State tax, octrio etc.	0.00	0.00	0.00	0.00	0.00	0.00
viii) Miscellaneous	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	12.33	12.88	12.16	8.67	9.74	7.50
3. Wholesale price	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
4. Expenses incurred by commission agent/mashakhors	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
a)Carriage, handling etc.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
b)Market fee & commission	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-Total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
5.Mashakhors' margin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
6. Mashakhors sale price	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
7.Retailers' Expenses	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
- Carriage & handling charges	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
- Retailer losses	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sub-total	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
8.Retailers' margin	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

N.A.: Not Applicable as FPOs shoulder the responsibility of marketing where the farmers are themselves retailers at times.

6.37 However, on the part of the expenses incurred by the vegetable growers it comes out that costs relating to assembling, packing and grading are the highest ranging between 3 to 6.5 per cent varying from crop to crop. The other major expenses on the part of the farmers are carriage up to road head and transporting the product to the market, both ranging between 1 to 3.5 per cent of net price received by the vegetable growers. As no rigorous packing is not needed to market the products in the local markets, the packing charges, transshipment and transport charges, all are quit low. Very basic packages like jute bags/tukri etc. are used for the purpose of packaging, while FPOs play a major role in transportation at nominal prices.

CHAPTER-7

Off-Season Vegetables in Polyhouses

7.1 Polyhouse farming is an alternative new technique in agriculture production for the farmers of Himachal Pradesh, Uttarakhand, Jammu & Kashmir and Sikkim. Polyhouse can make small holdings more viable by producing more high valued 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. 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.

Costs and Returns of Off-Season Vegetables in Polyhouse

7.2 Present section deals with the costs and returns from cultivation of off season vegetables inside polyhouse. The cost estimates may vary considerably for farmers operating in different size of polyhouses.

Cost of Construction of Polyhouse in Himachal Pradesh

7.3 Cost of construction of polyhouse basically depends upon the size and shape of polyhouse structure and type of polyhouse. Recently the polyhouse structure has 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. meters, 500 sq. meters and 1000 sq. meters is given in the following Tables. The construction of polyhouse 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 (250m^2)

7.4 It can be seen from the Table 7.1 that the total cost of polyhouse construction was Rs.270860 in which Rs.54172 was cost paid by the farmers and the rest Rs.216688 accounted for the subsidy amount.

Table 7.1 Cost of Construction of Polyhouse (250m^2)

(Rs./Polyhouse)

Particulars	Himachal Pradesh (250m2)			
	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land levelling		9000	1000	10000 (3.69)
Lay out		2500	150000	152500(56.30)
Erection of structure		2680	20000	22680 (8.37)
Covering by polythene		3000	42360	45360 (16.75)
Provision of sun shades		-	10080	10080 (3.72)
Erection of Trellis		-	-	-
Provision of shelves		-	-	-
Heaters		-	-	-
Coolers		-	-	-
Humidifiers		-	-	-
Drip irrigation system		5000	25080	30080 (11.11)
Drip irrigation		-	-	-
Fogger		-	160	160 (0.06)
Other		-	-	-
Total cost		22180	248680	270860 (100)
Amount of subsidy		-	-	216688 (80.00)
Net cost paid by farmer		-	-	54172 (20.00)

Note. *Figures in parenthesis denote percentages to total.*

In total cost estimation value of hired labour and material cost stand as Rs.22180 (8.19%) and Rs.248680 (9.81%) respectively. The most important component of total cost of construction was drawing the layout of polyhouse and accounted for Rs.152500 which is 56.30 percent of the total cost. The other components of total cost are the covering of polyhouses by polythene (16.75%), followed by installation of drip irrigation (11.11%), erection of structure (8.37%) provision of sunshades (3.72%) and land levelling (3.69%).

Cost of Construction of Polyhouse (500m^2)

7.5 The Table 7.2 reveals that the total cost of polyhouse was Rs.517180 out of which cost paid by the farmer was Rs.103436 and the rest Rs.413744 was the subsidy amount.

Table 7.2 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 (1.93)
Lay out		5000	290500	295500 (57.14)
Erection of structure		6000	34320	40320 (7.80)
Covering by polythene		7600	83120	90720 (17.54)
Provision of sun shades		-	20160	20160 (3.90)
Erection of Trellis		-	-	-
Provision of shelves		-	-	-
Heaters		-	-	-
Coolers		-	-	-
Humidifiers			-	-
Drip irrigation system		10500	49730	60230 (11.64)
Drip irrigation		-	-	-
Fogger		-	250	250 (0.05)
Other		-	-	-
Total cost		38100	479080	517180 (100)
Amount of subsidy		-	-	413744 (80.00)
Net cost paid by farmer		-	-	103436 (20.00)

Note. *Figures in parenthesis denote percentages to total.*

In total cost estimation the value of hired labour and material costs reported to be 7.37% and 92.63% respectively. The cost of drawing the layout of polyhouse was observed to be 57.14 per cent of the total cost, followed by the cost of covering of polyhouses by polythene (17.54%), installation of drip irrigation (11.64%), erection of structure (7.80%), provision of sunshades (3.90%) and land leveling (1.93%).

Cost of Construction of Polyhouse (1000m^2)

7.6 It may be seen from the Table 7.3 that the total cost of a polyhouse was Rs. 1003740 in which the net cost paid by the farmer was 20 per cent and the rest 80 per cent was the subsidy amount.

Table 7.3 Cost of Construction of Polyhouse (1000m^2)

(Rs./Polyhouse)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land levelling		13000	2000	15000 (1.49)
Lay out		12000	568500	580500 (57.83)
Erection of structure		10000	55520	65520 (6.53)
Covering by polythene		13000	168440	181440 (18.08)
Provision of sun shades		-	40320	40320 (4.02)
Erection of Trellis		-	-	-
Provision of shelves		-	-	-
Heaters		-	-	-
Coolers		-	-	-
Humidifiers		-	-	-
Drip irrigation system		12000	108610	120610 (12.02)
Drip irrigation		-	-	-
Fogger		-	350	350 (0.03)
Other		-	-	-
Total cost		60000	943740	1003740 (100)
Amount of subsidy		-	-	802992 (80.00)
Net cost paid by farmer		-	-	200748 (20.00)

Note. *Figures in parenthesis denote percentages to total.*

7.7 In total cost accounting the value of hired labour and material costs shared to the tune of 5.98percent and 94.02 percent respectively. Cost of drawing the layout of polyhouse was observed to be maximum i.e.57.83 percent followed by the cost of

covering of polyhouse by polythene (18.08%), installation of drip irrigation (12.02%), erection of structure (6.53%), provision of sunshades (4.02%) and land leveling (1.49%).

7.8 In the selected areas, most of the polyhouses are reported to have more than five years of old and the farmers informed that it was possible to get back the investment on polyhouse within a period of 3 to 5 years if and only if the effective execution of the project is materialized. After this period, whatever they earned (Gross return – (production cost + marketing cost)) from the crops/vegetables may be considered as profit.

Cost of Construction of Polyhouse in Jammu & Kashmir

7.9 The J&K government gives 80 percent subsidy to farmers for the construction of polyhouse and the farmers have to pay only 20 percent of the project cost. All the polyhouses in the sampled farmers were of simple type of polyhouse.

Table 7.4 Cost of Construction of Polyhouse (250m^2)

(Rs./Polyhouse)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land levelling	-	1000	-	1000 (6.67)
Lay out	-	1000	-	1000 (6.67)
Erection of structure	-	1500	11500	13000 (86.67)
Covering by polythene	-	-	-	-
Provision of sun shades	-	-	-	-
Erection of Trellis	-	-	-	-
Provision of shelves	-	-	-	-
Heaters	-	-	-	-
Coolers	-	-	-	-
Humidifiers	-	-	-	-
Drip irrigation system	-	-	-	-
Drip irrigation	-	-	-	-
Fogger	-	-	-	-
Other	-	-	-	-
Total cost	-	3500(23.33)	11500(76.67)	15000 (100)
Amount of subsidy	-	-	-	12000 (80.00)
Net cost paid by farmer	-	-	-	3000 (20.00)

Note. *Figures in parenthesis denote percentages to total.*

Table 7.4 states that the total cost of polyhouse construction was Rs.15000 in which 20 percent was paid by the farmer and the rest 80 percent was the subsidy amount. In total cost, value of hired labour was (23.33%) and material cost (76.67%). The most important component of total cost of construction was covering of polyhouse by polythene was 86.67 percent of the total cost.

Cost of construction of Polyhouse in Uttarakhand

7.10 The cost estimates may vary considerably for farmers operating in different sizes of poly houses though subsidy scheme was announced by the state government for the size ranging between 30-200 square meters of polyhouse. Construction of a poly house requires land leveling, planning and drawing the lay out, erection of structure and trellis, installation of drip irrigation, provision of sun shades and coverage of the polyhouse by

Table 7.5 Cost of Construction of Polyhouse (33-100M^2)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land leveling	1268.62	1268.62	0	2537 (6.00)
Lay out	475.73	475.73	158.58	1110 (2.62)
Erection of structure	1268.62	1268.62	9831.80	12369 (29.25)
Covering by polythene	0	1585.77	16914.93	18501 (43.75)
Provision of sun shades	0	370.01	1427.2	1797 (4.25)
Erection of Trellis	845.75	0	364.73	1210 (2.86)
Provision of shelves	0	0	0	0
Heaters	0	0	0	0
Coolers	0	0	0	0
Humidifiers	0	0	0	0
Drip irrigation system	0	237.87	2008.65	2247 (5.31)
Drip irrigation	264.3	0	1797.21	2062 (4.88)
Fogger	0	0	0	0
Other	0	211.44	243.15	455 (1.07)
Total cost	4123.01	5418.06	32746.25	42287 (100)
Amount of subsidy	-	-	-	38678 (91.46)
Net cost paid by farmer	-	-	-	3609 (8.53)

Note. *Figures in parenthesis denote percentages to total.*

polythene. For planning and drawing of the lay out, both the imputed value of family labor and the value of hired labour estimated to be Rs. 475.48 and the material cost is

Rs. 158.58 respectively. Imputed value of family labor and the value of hired labor are estimated to be Rs. 1268.62 required for erection of structure. Value of hired labor for covering the polythene is Rs. 1585.77.

7.11 Among other items included setting up of drip irrigation system and its running. The value of hired labour per poly house for installing drip irrigation system is Rs. 237.87 and the material cost is 2008.65 which take the total cost to approximately Rs. 2247. Average cost of construction of a poly-house of size 33- 100 square meters is estimated as Rs. 42287 which can be split into imputed value of family labor at Rs. 4123.01; value of hired labor of Rs. 5418.06 and the material cost of Rs. 32746.25. 7.12 Although poly house cultivation may rise 10-12 times higher than that of outdoor cultivation yet economic growth adoption of poly-house techniques for protected cultivation has not been quite successful in high hills. It is found that in the blocks of Tapovan and Urgam advanced technologies like provision of shelves, heaters, coolers, humidifiers, evaporative cooling, nutrient application system, porous flooring and benches are still not in use.

Cost of construction of Polyhouse in Sikkim

7.13 In Sikkim it was observed that all the polyhouse structures have been constructed with 100 per cent subsidy basis by the government. As such, there is no information on the part of the vegetable growers regarding costs involved in construction of polyhouse. They, as beneficiaries of MIDH scheme, had to provide land only for the polyhouses, while the contractors on behalf of the government do the rest. It was learned that overall, the cost of construction was set at Rs.1050/- per sq. mt. as it was the lowest quoted price by the bidder contractors.

Cost of Cultivation of Vegetables

7.14 The cost estimates may vary considerably for farmers operating in different size of polyhouses. It was found that the sampled farmers have been growing different vegetable crops in the polyhouses though area devoted to most of these crops was very less and the farmer's paid little attention to these crops. It should be noted here that as compared to other parts of India, costs on account of fertilizers and pesticides in Sikkim are minimal. This is because of the fact that Sikkim is the first organic state to be declared by the central government, and no chemical fertilizers or pesticides are being used in Sikkim. In Sikkim, the major input for soil health is application of manure, which

is cheap and readily available with the farmers. Only in a few cases, use of vermin-compost, bio-fertilizers and bio-pesticides (like hormone traps) can be observed.

Cost of Cultivation of Capsicum

7.15 Cost of cultivation of capsicum in Himachal Pradesh is presented in Table 7.6. The analysis states that stalking of individual plant was the largest cost component accounting for 26 percent. 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 2.93 percent of the total cost. The cost of bed formation, transplanting the sapling and interculture together was higher and estimated to be 19 percent.

Table 7.6 Cost of Cultivation of Capsicum in Polyhouse

(Rs. /polyhouse)

	HP		Jammu & Kashmir		Uttarakhand		Sikkim	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Formation of beds	3347	6.16			1190.00	11.76	160.00	6.4
Seed/ seedlings	1593	2.93			1156.75	11.43	394.00	15.9
Transplanting	3323	6.11			602.26	5.95	128.00	5.2
Manuring/FYM	8225	15.13			2032.75	20.08	173.90	7.0
Vermicompost	-	-			0.00	0.00	0.00	0.0
Fertilizer	2745	5.05			0.00	0.00	0.00	0.0
Insecticides/pesticides	2807	5.16			53.34	0.53	0.00	0.0
Inter culture	3523	6.48			1239	12.24	512.00	20.6
Irrigation	2080	3.83			1137.5	11.24	76.40	3.1
Spraying	1079	1.99			993.59	9.82	0.00	0.0
Stalking etc.	14233	26.19			439.09	4.34	128.00	5.2
Harvesting/ picking	7390	13.59			1277.5	12.62	784.00	31.6
Soil sterilization	4008	7.38				0.00	128.00	5.2
Total	54352	100.00			10121.78	100.00	2484.30	100.0

7.16 Cost of formation of beds for the sampled farmers in Uttarakhand was worked out to be Rs. 1190, overall cost for formation of beds contributed 11.76 per cent of the total

cost incurred in cultivation of capsicum in poly- house. The cost of seed/ seedlings was calculated to be Rs. 1156.75 and contributed 11.43 per cent of total cost and cost of transplanting was calculated to be Rs. 602.26 constituting about 5.95 per cent of the total cost of cultivation. Manuring and farm yard manuring reported to be around 20.08 per cent to the total cost of cultivation. The cost of items like insecticides and pesticides was calculated Rs. 53.34, further enhancing to 0.53 per cent of the cost of cultivation of capsicum.

7.17 Inter culture was calculated at Rs. 1239 and it contributed 12.24 per cent of the total cost of cultivation. The cost of irrigation was calculated at Rs. 1137.5 and it amounted to 11.24 and spraying added Rs. 993.59 i.e. 9.82 per cent to the total cost of cultivation of capsicum. Cost of stalking is Rs. 439.09 and added 4.34 per cent and harvesting and picking of capsicum comes out to be Rs. 1277.5 contributing 12.62 per cent to the total cost of cultivation.

7.18 The analysis reveals that for the farmers in Sikkim, harvesting/picking was the largest cost component accounting for 31.6 percent, followed by interculture (20.6%), seeds/seedlings (15.9%), manure/FYM (7.0%), transplanting, stalking, soil sterilization (5.2% each) and irrigation (3.1%). No farmer was observed in using, fertilizer and insecticide/pesticides in this crop.

Cost of Cultivation of Tomato

7.19 The cost of cultivation of tomato of the farmers in Himachal Pradesh is given in Table 7.7. It can be seen from the Table that the cost of cultivation of tomato, at overall level was Rs. 62543 per polyhouse. The analysis also reveals that stalking of individual plants was the largest cost component accounting for 22 percent of the total cost followed by the cost of fertilizer (16%) and harvesting/picking (12%).

7.20 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 of the sapling was found to be higher. 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.

Table 7.7 Cost of Cultivation of Tomato in Polyhouse

(Rs. /polyhouse)

	HP		Jammu & Kashmir		Uttarakhand		Sikkim	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Formation of beds	2693	4.31			700.00	13.23	256.00	11.1
Seed/ seedlings	1776	2.84			700.00	13.23	283.76	12.3
Transplanting	4670	7.47			300.00	5.67	128.00	5.5
Manuring/FYM	5026	8.03			791.67	14.96	142.31	6.1
Vermicompost	-	-			0.00	0.00	0.00	0.0
Fertilizer	10204	16.31			0.00	0.00	0.00	0.0
Insecticides/pesticides	6029	9.64			195.00	3.69	0.00	0.0
Inter culture	3520	5.63			583.33	11.03	312.00	13.5
Irrigation	2099	3.36			525.00	9.92	6.00	0.3
Spraying	1127	1.80			272.92	5.16	0.00	0.0
Stalking etc.	13984	22.36			464.58	8.78	128.00	5.5
Harvesting/ picking	7301	11.67			758.33	14.33	932.00	40.2
Soil sterilization	4114	6.58			0.00	0.00	128.00	5.5
Total	62543	100.0			5290.83	100.0	2316.07	100.0

7.21. Considering the various items which contributed to the total cost of cultivation of tomato, the cost of formation of beds in Uttarakhand is found to be Rs. 700 which accounts for 13.23 per cent of the total cost. Seed or seeding shows an amount of Rs. 700 and contributed 13.23 per cent and transplanting contributing to Rs. 300 i.e.5.67 per cent to total cost of cultivation. Manuring and farm yard manuring amounts to Rs. 791.67

and added 14.96 per cent of tomato per poly house. Costs of using insecticides and pesticides were Rs. 195 and added only 3.69 per cent to the total cost of cultivation of tomato per poly-house. The cost of inter culture was calculated to be Rs. 583.33 which contributed 11.03 per cent and the cost of irrigation was calculated at Rs. 525 and contributed 9.92 per cent to the total cost of cultivation of tomato.

7.22 Use of spraying pesticides and fungicides for cultivation of tomato is rampant in Uttarakhand. Costs for stalking sticks for the cultivation of tomato was found to be Rs. 464.58 and accounts for 8.78 per cent and harvesting and picking up the tomato of calculated to be Rs. 758.33 contributing 14.33 per cent of the total cost cultivation of the tomato. Total cost of cultivation of tomato was found to be Rs. 5290.83 in 33 square meters' poly house cultivation.

7.23 The analysis reveals that in Sikkim harvesting/picking was the largest cost component accounting for 40.2 percent, followed by interculture (13.5%), seeds/seedlings (12.3%), manure/FYM (6.1%), transplanting, stalking, soil sterilization (5.5% each) and irrigation (0.30%).

Cost of Cultivation of Peas

7.23 Table 7.8 shows the detailed break-up of the total cost of cultivation per poly house for peas in Uttarakhand. Formation of beds amounted to Rs. 840 and contributed 14.28 per cent and transplanting amounts to Rs. 450 contributing 7.65 per cent of the total cost of cultivation. Manuring and farm yard manuring of the cost of Rs. 896 and contributed 15.23 per cent to the total cost cultivation. Inter culture operation for growing peas under protected agricultural pattern was amounted to Rs. 770 and Irrigation was calculated to Rs. 437.50 contributing 7.44 per cent to the total cost of cultivation. Use of spray inside the poly house was calculated to an amount of Rs. 290 and cost of stalking is calculated to Rs. 260 and contributing 4.42 per cent of the total cost of cultivation. Costs of harvesting and picking stand as Rs. 770 further contributing 13.09 per cent to the total cost of cultivation. Thus the total cost of cultivation of peas was calculated around Rs. 5883.50 under protected agricultural pattern for all poly house farmers in the state of Uttarakhand.

Table 7.8 Cost of Cultivation of Peas in Polyhouse

(Rs. /polyhouse)

	Himachal Pradesh		Jammu & Kashmir		Uttarakhand		Sikkim	
	Rs.	**%**	**Rs.**	**%**	**Rs.**	**%**	**Rs.**	**%**
Formation of beds					840.00	14.28		
Seed/ seedlings					840.00	14.28		
Transplanting					450.00	7.65		
Manuring/FYM					896.00	15.23		
Vermicompost					0.00	0.00		
Fertilizer					0.00	0.00		
Insecticides/pesticides					330.00	5.61		
Inter culture					770.00	13.09		
Irrigation					437.50	7.44		
Spraying					290.00	4.93		
Stalking etc.					260.00	4.42		
Harvesting/ picking					770.00	13.09		
Soil sterilization					0.00	0.00		
Total					5883.5	100.00		

Cost of Cultivation of Cauliflower

7.25 Table 7.9 shows formation of beds costs Rs. 910 per poly house i.e.15.44 per cent, costs of seed and seedlings as Rs. 840 contributing 14.25 per cent and transplanting amounts to Rs. 360 and added 6.11 per cent for calculating the total cost of cultivation. A cost of Rs. 815 was incurred for manuring and farm yard manuring and added 13.83 per cent to the total cost of cultivation of cauliflower. Cost of insecticides and pesticides are calculated to be Rs. 285 and added only 4.83 per cent, inter culture has added an expense of Rs. 840 per house and contributed 14.25 per cent to the total cost of cultivation. On account of irrigation further a cost of Rs. 490 is incurred which added 8.31 per cent to the total cost of cultivation of cauliflower.

Table 7.9 Cost of Cultivation of Cauliflower in Polyhouse

(Rs. /polyhouse)

Cost Items	Himachal Pradesh		Jammu & Kashmir		Uttarakhand		Sikkim	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Formation of beds					910.00	15.44		
Seed/ seedlings					840.00	14.25		
Transplanting					360.00	6.11		
Manuring/FYM					815.00	13.83		
Vermicompost					0.00	0.00		
Fertilizer					0.00	0.00		
Insecticides/pesticides					285.00	4.83		
Inter culture					840.00	14.25		
Irrigation					490.00	8.31		
Spraying					380.00	6.45		
Stalking etc.					205.00	3.48		
Harvesting/ picking					770.00	13.06		
Soil sterilization					0.00	0.00		
Total					5895	100.00		

7.26 The cost of spraying for a small poly house farmer has been calculated to be Rs. 380 and it further added 6.45 per cent and for stalking incurred another 3.48 per cent has been accrued to the total cost of cultivation. Harvesting and picking contribute 13.06 per cent to the total cost of cultivation.

Cost of Cultivation of beans

7.27 Table 7.10 shows the total cost of various items which contributed to calculate the total cost of cultivation of beans for small poly house farmers. Costs of formation of beds were calculated around Rs. 816.67 contributing 18.97 per cent to the total cost of cultivation of beans under poly house agriculture.

Table 7.10 Cost of Cultivation of bean in Polyhouse

(Rs. /polyhouse)

Cost Items	Himachal Pradesh		Jammu & Kashmir		Uttarakhand		Sikkim	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%
Formation of beds					816.67	18.97		
Seed/ seedlings					583.33	13.55		
Transplanting					116.67	2.71		
Manuring/FYM					381.67	8.87		
Vermicompost					0.00	0.00		
Fertilizer					0.00	0.00		
Insecticides/pesticides					422.50	9.82		
Inter culture					700.00	16.26		
Irrigation					350.00	8.13		
Spraying					154.17	3.58		
Stalking etc.					195.83	4.55		
Harvesting/ picking					583.33	13.55		
Soil sterilization					0.00	0.00		
Total					4304.17	100.00		

Cost of seed and seedling amounts to Rs. 583.33 and added 13.55 per cent and transplanting contributing 2.71 per cent to the total cost of cultivation. Manuring and farm

yard manuring was having a cost of Rs. 381.67 and costs of using insecticides and pesticides estimated to be Rs. 422.50 contributing 9.82 per cent of the total cost of cultivation.

7.28 Inter culture was calculated to be Rs. 700 and it contributed to 16.26 per cent and Irrigation was amounted to Rs. 350 adding 8.13 per cent to the total cost of cultivation. Spraying and stalking was calculated for an amount of Rs. 154.17 and Rs. 195.83 and harvesting and picking was calculated for an amount of Rs. 583.33 contributing 13.55 per cent to the total cost of cultivation of French beans. Therefore total costs for growing beans under protected farming for small poly house farmers are found to be Rs. 4304.17.

Net Returns from Cultivation of Vegetable Crops

7.29 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.

Net Returns from Cultivation of Capsicum

7.30 It can be seen from the Table 7.11 that the production cost for a farmer in HP amounts to Rs. 54352 and the marketing cost amounts to Rs. 26750 aggregating total cost to Rs. 81102 approximately. The gross return from capsicum cultivation was Rs. 230789 and hence the net return was Rs. 149686.

Table 7.11 Net Returns from Cultivation of Capsicum in Polyhouse

(Rs. /polyhouse)

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Production cost	54352		10121.78	2484.30
Marketing cost	26750		243.04	2215.80
Total cost	81102		10364.82	4700.10
Gross Returns	230789		4348.8	28319.14
Net returns	149686		-6016.02	23619.04

7.31. It is found that production cost for a farmer in Uttarakhand amounts to Rs. 10121.78 and the marketing cost amounts to Rs. 243.04 .Gross return was from capsicum cultivation was estimated to be Rs. 4348.8 and hence the net return was reported as Rs. 6016.02.

7.32 Production cost for a farmer in Sikkim amounts to Rs. 2484.30 and the marketing cost estimated as Rs. 2215.80 accounted to total cost of as Rs. 4700.10. The gross return was from capsicum cultivation was Rs. 28319.14 and hence the net return was Rs. 23619.04.

Net Returns from Cultivation of Tomato

7.33 The Table shows that the production cost for a farmer in Himachal Pradesh amounts to Rs. 62543 and the marketing cost amounts to Rs. 45263. Gross return from tomato cultivation was Rs. 334948 and hence net return was estimated to be Rs. 227142.

Table 7.12 Net Returns from Cultivation of Tomato in Polyhouse

(Rs. /polyhouse)

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Production cost	62543		5290.83	2316.07
Marketing cost	45263		236.167	1649.88
Total cost	107806		5527	3965.95
Gross Returns	334948		4428.33	21124.09
Net returns	227142		-1098.7	17158.14

7.34 The production cost as has been obtained from Table 7.13 for Uttarakhand was Rs. 5290.83 and the marketing cost was Rs. 236.17 which resulted in a total cost of Rs. 5527. Since the gross return or the selling price received by the farmer was Rs. 4428.33, the net returns were found as Rs. 1098.67.

7.35 The Table reveals that the production cost for a farmer in Sikkim amounts to Rs. 2316.07 and the marketing cost amounts to Rs. 1649.88 .The gross return from tomato cultivation was found to be Rs. 21124.09 and hence the net return was accounted for Rs. 17158.14per poly house.

Net Returns from Cultivation of Peas

7.36 Table 7.13 shows the net return from cultivation of peas in Uttarakhand. While the production cost was found to be Rs. 5883.50, the total marketing cost was Rs. 179; cost incurred on cultivation of pea during the studied season was Rs. 6062.50. On the other hand,

the farmers received an amount of Rs. 3829.20 as a gross return after selling the produce in the market. Therefore, the net returns from cultivation of peas were Rs. -2233.30 for the farmers growing it.

Table 7.13 Net Returns from Cultivation of Peas in Polyhouse

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Production cost	0.00	0.00	5883.50	0.00
Marketing cost	0.00	0.00	179	0.00
Total cost	0.00	0.00	6062.50	0.00
Gross Returns	0.00	0.00	3829.20	0.00
Net returns	0.00	0.00	-2233.30	0.00

Net Returns from Cultivation of Cauliflower

7.37 Table 7.14 shows the net returns from cultivation of cauliflower for the sampled farmers in the state of Uttarakhand. Here the total cost incurred per polyhouse was Rs. 6069.40; the gross return received was Rs. 3270.50 per poly house resulting in net returns of -Rs.2798.90.

Table 7.14 Net Returns from Cultivation of Cauliflower in Polyhouse

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Production cost	0.00	0.00	5895	0.00
Marketing cost	0.00	0.00	174.4	0.00
Total cost	0.00	0.00	6069.4	0.00
Gross Returns	0.00	0.00	3270.5	0.00
Net returns	0.00	0.00	-2798.9	0.00

Net Returns form cultivation of French Bean in Polyhouse

7.38 The net return from cultivation of French bean is shown in Table 7.15.Total production cost incurred was Rs. 4304.17 per poly house and the total marketing cost was Rs. 173.33 per

poly house. Hence the total cost was estimated to be as Rs. 4477.50 per poly house. Further the table shows a gross return of Rs. 2007.50 per poly house for bean resulting net return to be negative (-Rs. 2470) in the state of Uttarakhand.

Table 7.15 Net Returns form cultivation of Bean in Polyhouse

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Production cost	0.00	0.00	4304.17	0.00
Marketing cost	0.00	0.00	173.33	0.00
Total cost	0.00	0.00	4477.5	0.00
Gross Returns	0.00	0.00	2007.5	0.00
Net returns	0.00	0.00	-2470	0.00

Net Returns per box from Capsicum Cultivation

7.39 Net returns per box of capsicum are presented in Table 7.16. It can be seen from this Table that on an average total production In Himachal Pradesh 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 net returns of Rs. 260 per box at overall level. The input-output ratio (gross returns/production cost, was 1:4.25 polyhouse farmers respectively.

Table 7.16 Net Returns per box and Input-Output Ratio from Cultivation of Capsicum in Polyhouse

(Rs. /box of 20 Kgs)

	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Total production (boxes, per polyhouse in a year)	402		321	NA*
Cost per box	194		1579	NA
Value per box	574		678	NA
Returns per box	260		-901	NA
Input output ratio	1:4.25		0.43	NA

** As FPO shoulders the responsibility of marketing the output in local markets, question of packing in boxes does not arise.*

7.40 Table 7.16 shows the net returns per box and input-output ratio from cultivation of capsicum in poly house in Uttarakhand. As can be seen from the table, total number of boxes in which the entire production was packed was 321. The average cost per box was Rs. 1579 and the value per box was Rs. 678 so that the average (net) return per box was - Rs. 901. Hence the input output ratio was 0.43 for capsicum.

Net Returns per box from Tomato Cultivation

7.41 The net returns per box of tomato are presented in Table 7.17. The Table reveals that on an average total production in Himachal Pradesh were 566 boxes per polyhouse in a year. The cost per box was Rs. 185 and its value in market was Rs. 592 resulting net return of Rs. 407 per box and overall the input-output ratio (gross returns/production cost) was 1:5.35 per polyhouse farmers respectively.

Table 7.17 Net Returns per box and Input-Output Ratio from Cultivation of Tomato in Polyhouse

(Rs. /box of 25 Kgs)

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Total production (boxes, per polyhouse in a year)	566		37	NA*
Cost per box	185		853	NA
Value per box	592		714	NA
Returns per box	407		-139	NA
Input output ratio	1:5.35		0.84	NA

** As FPO shoulders the responsibility of marketing the output in local markets, question of packing in boxes does not arise.*

7.42 Table 7.17 shows the net returns per box and input-output ratio for tomato cultivation in poly house by the sampled farmers in Uttarakhand. The total number of boxes used for storing the entire produce was 37, average cost per box was Rs. 853 and the average value per box turned out to be Rs. 714. Accordingly, the average net returns per box were Rs. -139. Hence the input output ratio was found to be 0.84 for tomato seemingly better than capsicum.

Net Returns per box from Peas Cultivation

7.43 Table 7.18 shows that in Uttarakhand total produce was contained in 18 boxes, the average cost per box was found to be Rs. 1634 and the average value per box was Rs. 1064. Hence the average net returns per box were turned out to be Rs. -571. The input-output ratio was found to be 0.65, though not the lowest yet found significantly less than 1.

Table 7.18 Net Returns per box from Peas Cultivation

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Total production (boxes, per polyhouse in a year)			18	
Cost per box			1634	
Value per box			1064	
Returns per box			-571	
Input output ratio			0.65	

Net Returns per box from cauliflower Cultivation

7.44 Table 7.19 presents the average net returns per box and input-output ratio from cultivation of cauliflower by the sampled poly house farmers in Uttarakhand. The Table exhibits that the entire produce of cauliflower could be contained in 25 boxes. The average cost per box went up to Rs. 1179 per box and the average value per box was Rs. 654. Hence the average net return per box was -Rs. 525 during the studied period. Further the Table shows that the input-output ratio was 0.55 for cultivation of cauliflower in the poly houses which clearly indicates the cauliflower cultivation inside polyhouse is not economical.

Table 7.19 Net Returns per box from cauliflower Cultivation

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Total production (boxes, per polyhouse in a year)			25	
Cost per box			1179	
Value per box			654	
Returns per box			-525	
Input output ratio			0.55	

Net Returns per box from French Bean Cultivation

7.45 Table 7.20, in Uttarakhand 6 boxes were used to pack the produce of bean and shows that the average cost of production per box was Rs. 2152 and the average value per box was Rs. 335.

Table 7.20 Net Returns per box from French bean Cultivation

	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Total production (boxes, per polyhouse in a year)			6	
Cost per box			2152	
Value per box			335	
Returns per box			-1818	
Input output ratio			0.16	

Hence the average net returns per box were -Rs. 1818 which leads to an input-output (rather output-input) ratio of just 0.16. The ratio is lowest among all the vegetables under study indicating that beans is the most unproductive among the vegetables cultivated inside polyhouse by the sampled farmers.

Marketing System of Polyhouse Vegetable Crops

7.46 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 Vegetable Crops

7.47 The production and utilization pattern of capsicum and tomato in sampled area has been presented in Table 7.21. The analysis reveals that out of the total production of 402 boxes (per polyhouse in a year) of capsicum at overall level only 2.00 percent were the losses at different stages. Family consumption and gifts accounted for 0.75 and 0.50 percent of the total production respectively. In case of tomato, the total production per polyhouse in a year was 566 boxes out of which 1.41 percent was losses at different stages. Only 0.71 percent boxes were consumed by the farming family and 0.35 percent given as gifts.

Table 7.21 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.)					
Himachal Pradesh	402	2.00	0.75	0.50	-
Jammu & Kashmir					
Uttarakhand	321	1.64	15.21	3.21	2.29
Sikkim	9.76	2.7	1.5	0.0	0.0
Tomato (Box of 25 Kgs.)					
Himachal Pradesh	566	1.41	0.71	0.35	-
Jammu & Kashmir					
Uttarakhand	37	0.43	15.59	1.61	0.65
Sikkim	5.13	2.9	4.6	0.0	0.0
Peas (Box of 25 Kgs.)					
Himachal Pradesh					
Jammu & Kashmir					
Uttarakhand	18	0.00	17.02	3.19	0.00
Sikkim					
Cauliflower (Box of 25 Kgs.)					
Himachal Pradesh					
Jammu & Kashmir					
Uttarakhand	25	0.88	16.67	2.28	0.35
Sikkim					
French Bean (Box of 25 Kgs.)					
Himachal Pradesh					
Jammu & Kashmir					
Uttarakhand	6	0.00	20.00	0.00	0.00
Sikkim					

7.48 From the Table it can be easily read that the total production of capsicum was approximately 321 boxes. On the other hand, 1.64 per cent is lost for various reasons related to production and marketing, further 15.21 per cent is used for family consumption, 3.21 per cent retained as gifts and 2.29 per cent is handed out as wages in kind to the hired labours. Similarly out of 37 boxes of tomato production, the farmers have to borne a total loss of 0.43 per cent of the total production,15.59 per cent was retained for family usage and 1.61 per cent and 0.65 per cent were given out as gifts and wages in kind. However no losses were reported in case of beans. As far as cauliflower is concerned, out of 5.7 quintals of production 4.55 quintals were marketed.

Marketing Pattern Vegetable Crops

7.49 The main destinations for the vegetable produce inside the polyhouses by the selected farmers in Himachal Pradesh were local markets and the Chandigarh market. Table 7.22 presents the details of the markets. The analysis reveals that out of total marketed surplus of 389 boxes of capsicum, 345 boxes were marketed in Chandigarh market and rest 44 boxes in the local markets. In case of tomato, out of total marketed produce of 552 boxes, 496 boxes were marketed in Chandigarh market and rest 56 boxes in the local markets.

Table 7.22 Marketing Pattern of Polyhouse Crops on Sampled Farms

(Qty. in boxes; Rate in Rs.)

Category	Sold at							
	Chandigarh/ Joshimath /Gopeshwar /Karna paryag		Neighbouring States		Local markets		Total	
	Qty	Rate/box	Qty	Rate/box	Qty	Rate/box	Qty	Rate/box
Capsicum								
Himachal Pradesh	345	595	-	-	44	412	389	574
Jammu & Kashmir								
Uttarakhand	249	668					249	668
Sikkim	-	-	6.65	684.16	2.70	4686.33	9.35	757.25
Tomato								
Himachal Pradesh	496	618	-	-	56	389	551	592
Jammu & Kashmir								
Uttarakhand	30	708					30	708
Sikkim	-	-	2.95	896.08	1.79	4405.16	4.75	890.40
Peas								
Himachal Pradesh								
Jammu & Kashmir								
Uttarakhand	15	1016					15	1016
Sikkim								
Cauliflower								
Himachal Pradesh								
Jammu & Kashmir								
Uttarakhand	18	718					18	718
Sikkim								
Frenchbean								
Himachal Pradesh								
Jammu & Kashmir								
Uttarakhand	5	1004					5	1004
Sikkim								

7.50 Chamoli district situated in a very high altitude of the hills and also not well connected to the other parts of the states, the vegetables are being sold entirely in one or more of the three major markets of the district itself, namely Joshimath, Gopeshwar and KarnaPrayag, are located at a distance of roughly 60- 80 kms away from the polyhouses covered under cultivation. Since these markets are far from the local set up, are treated as far-off markets in this study. The Table 7.21 provides details of the quantity (in boxes) of each vegetable sold in these markets and the rate at which they are sold. Peas are being sold at the highest price followed by beans.

7.51 Table 7.22 reveals that for Sikkim out of total marketed surplus of 9.35 boxes of capsicum, 6.65 boxes were marketed in neighbouring states and rest 2.70 boxes in the local markets. In case of tomato, out of total marketed produce of 4.75 boxes, 2.95 boxes were marketed in neighbouring states and rest 1.79 boxes in the local market.

Marketing Costs of Vegetables in Far-off Market

7.52 The marketing costs incurred by producer for marketing capsicum and tomato in Chandigarh market are presented in Table 7.23. On an average, marketing cost per quintal in case of capsicum, incurred by producer was Rs.333.

Table 7.23 Marketing Costs of Vegetables in Far-off Markets

(Rs./Qtl.)

Particulars	Himachal Pradesh	Jammu & Kashmir	Uttarakhand	Sikkim
Capsicum				
Gross returns received by grower	2873		3368.88	5025.62
Growers' expenses on				
Picking, packing, grading and assembling	65		105.84	174.46
Packing material	6		6.6	58.17
Transportation				
(i.) Carriage up to road head	17		130.6	153.88
(ii).Freight up to market	73		0	0.00
(iii). Loading/unloading charges	10		0	0.00
Commission of C.A. and market fee	152		0	0.00
Other charges	10		0	0.00
Total expenses paid by the grower	333		243.04	386.51
Tomato				
Gross returns received by grower	2370		3585.83	4476.19
Growers' expenses on				
Picking, packing, grading and assembling	80		58.67	155.23
Packing material	6		54.17	54.19

Transportation				
(i.) Carriage up to road head	18		75.00	140.96
(ii).Freight up to market	73		41.67	0.00
(iii). Loading/unloading charges	10		0.00	0.00
Commission of C.A. and market fee	123		6.67	0.00
Other charges	10		0.00	0.00
Total expenses paid by the grower	320		236.17	350.38
Peas				
Gross returns received by grower			3046.55	
Growers' expenses on				
Picking, packing, grading and assembling			78	
Packing material			37	
Transportation				
(i.) Carriage up to road head			64	
(ii).Freight up to market			0	
(iii). Loading/unloading charges			0	
Commission of C.A. and market fee			0	
Other charges			0	
Total expenses paid by the grower			179.00	
Cauliflower				
Gross returns received by grower			2614.75	
Growers' expenses on				
Picking, packing, grading and assembling			51.2	
Packing material			41.2	
Transportation				
(i.) Carriage up to road head			22	
(ii).Freight up to market			60	
(iii). Loading/unloading charges			0	
Commission of C.A. and market fee			0	
Other charges			0	
Total expenses paid by the grower			174.40	
Frenchbean				
Gross returns received by grower			1606.25	
Growers' expenses on				
Picking, packing, grading and assembling			13.33	
Packing material			20.00	
Transportation				
(i.) Carriage up to road head			140.00	
(ii).Freight up to market			0.00	
(iii). Loading/unloading charges			0.00	
Commission of C.A. and market fee			0.00	
Other charges			0.00	
Total expenses paid by the grower			173.33	

7.53 The breakup of marketing costs incurred by the capsicum producers in Himachal Pradesh reveals that activities of commission agent and transportation constituted major share in total

cost of producers. Generally the commission agent charged 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 for tomato commission agent usually charges Rs.123 per quintal. Grower's expenses on transportation, picking, packing and packing material were estimated to be Rs.101, Rs.80 and Rs.6 per quintal respectively.

7.54 Table 7.23 shows the costs incurred during selling of the vegetables in Uttarakhand in far off market by the small poly house farmers. An amount of Rs. 105.84 and Rs. 78 per quintal were incurred on picking, packing, grading and assembling of capsicum and pea respectively, the cost under the same heads for French bean is reported to be Rs. 13.33 per quintal. However, the cost of packing material in case of French bean is substantially higher at Rs. 20 per quintal compared to Rs. 6.6 per quintal for capsicum. Due to perishable nature, cost of packing of tomato was found to be higher in comparison to other vegetables.

7.55 Moreover, during harvesting and transportation of crops from field to the markets in various phases of operation cater a substantial portion of cost of production. It can be seen from the Table that the maximum cost of carriage up to the road head is incurred for French beans followed by capsicum, tomato, peas and cauliflower. No further expenses are reportedly incurred by the growers excepting a negligible commission of C.A. and market fee for tomato. The total expenses paid by the grower therefore were Rs. 243.04 and Rs. 236.17 per quintal for capsicum and tomato respectively and Rs. 179, Rs. 174.40 and Rs. 173.33 for peas, cauliflower and French beans and average total gross returns received were estimated to be Rs. 3368.88 and Rs. 3585.83 per quintal for capsicum and tomato.

7.56 As the vegetable growers in Sikkim are found to have not sold their output to the far-off markets, enumeration of marketing in the local markets has been done accordingly.

7.57 It is noticed that the farmers do not have to incur any market fee or commission in the local markets or organic vegetable kiosks, as those are set up and actively promoted by the state government itself. Under MIDH scheme the state Government even arrange for pick-up trucks at remote villages every morning to collect and transport vegetables in the local markets. As such, the costs on account of marketing in nearby markets involve picking, packing, assembling, grading (with their material and labour costs) and carriage of the output up to road head is found to be nil. However, as compared to gross return received by the vegetable growers per quintal of output, these costs together account for 7.7 per cent and 7.83 per cent respective for capsicum and tomato.

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.

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 and hence, analysis of multiple responses has been used for this purpose.

Problems in Raising Nursery inside Polyhouse

8.3 As far as the cultivation of off season vegetables is concerned, it is found that the sampled farmers of Jammu & Kashmir raise only nursery inside polyhouses and grow vegetables outside polyhouse. But the farmers have many problems related to polyhouse construction and inputs availability. Majority of farmers faced more than one problem and hence, analysis of multiple responses has been used and reported for this purpose.

Problems Faced in Adoption and Construction of Polyhouse

8.4 The polyhouse growers of the selected areas were asked about the problems they faced related to construction schedule information, technology transfer, Construction materials etc.

8.5 Table 8.1 reveals that in HP, 51 percent of the growers complained that contractor delayed the execution works followed by the responses regarding cumbersome clearance from department (50%), delays in technology transfer (50%), construction materials not locally available (46%), high construction cost (45%), unavailability of construction of skilled labour (43%), long wait for clearance/subsidy (42%) and information not provided clearly.

Table 8.1 Problems Faced in Adoption and Construction of Polyhouse

(*Multiple Responses in %)*

Type of Problem	H.P	J&K	Uttrakhand	Sikkim
Information not provided clearly	28.00	60.00	57.75	0.0
Cumbersome clearance from department	50.00	44.00	76.06	0.0
Delays in technology transfer	50.00	30.00	77.46	0.0
Long wait for loan clearance/subsidy	42.00	64.00	52.11	0.0
Construction materials not locally available	46.00	56.00	95.77	0.0
Contractor delayed the execution	51.00	60.00	43.66	68.0
High construction cost	45.00	44.00	49.30	0.0
Unavailability of skilled labour	43.00	30.00	63.38	0.0

8.6 In J&K 64 percent of the growers complained about long wait for clearance/subsidy, followed by the responses relating to contractor delayed the execution (60%), information not provided clearly (60%), construction materials not locally available (56%), cumbersome clearance from department (44%), high construction cost (44%), delays in technology transfer (30%) and unavailability of construction of skilled labour.

8.7 In Uttarakhand 95.77 percent growers complained that construction materials not locally available followed by delays in technology transfer (77.46%) cumbersome clearance from department (76.06%), unavailability of construction of skilled labour (63.38%), information not provided clearly (57.75%), long wait for clearance/subsidy (52.11%), high construction cost (49.30%) and contractor delayed the execution works (43.66). In sikkim 68 percent growers complained that the contractors delayed the execution works.

Problems Faced in Input Availability

8.8 Various problems like unavailability, higher prices and low quality of inputs were faced and reported by the growers in Himachal Pradesh. Sixty percent of the growers complained about the problem of higher prices of inputs required for raising of seedling

in a polyhouse followed by the problem of low quality of inputs (58%) and unavailability of inputs (49%).

Table 8.2 Problems Faced in Input Availability

(Multiple Responses in %)

Type of problem	Himachal Pradesh	Jammu & Kashmir	Uttrakhand	Sikkim
Unavailability	49.00	56.00	66.20	0.0
Higher prices	60.00	76.00	97.18	64.0
Low quality	58.00	74.00	95.77	76.0

Jammu & Kashmir:

8.9 76 percent growers in J&K complained about the problem of higher prices of inputs required for rising of seedling in a polyhouse followed by the problem of low quality of inputs (74%) and unavailability of inputs (56%) respectively.

8.10 In Uttarakhand 97.18 percent of the growers and 64 percent in Sikkim complained about the problem of higher prices of inputs required for raising of seedling in a polyhouse.

Problems Faced in Cropping Practices

8.11 The cropping practices are significantly different in polyhouses than that of 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 and found eighty one percent of them 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 time of sowing. About 30 percent farmers reported that they had no knowledge about the proper time to irrigate the vegetables grown in polyhouse and also of sowing and intensity of irrigation. Data further reveals that about 27 percent farmers said that they had no knowledge about sowing intensity.

Table 8.3 Problems Faced in Cropping Practices

(Multiple Responses in %)

Type of problem	Himachal Pradesh	Jammu & Kashmir	Uttrakhand	Sikkim
Sowing time	72.00	-	67.61	0.0
Sowing Intensity	27.00	-	67.61	32.0
Cultural practices	81.00	-	70.42	0.0
Time and intensity of irrigation	30.00	-	92.96	44.0

8.12 In Uttarakhand 67.61 per cent of the farmers complained about the time of sowing. Seventy per cent of them complained about the cultural practices, about 93 per cent reported they had faced problem with time and intensity of irrigation and nearly 68 per cent complained about sowing intensity.

8.13 In Sikkim about 44 per cent of the farmers said they had faced problem with time and intensity of irrigation and nearly 32 per cent had complained about sowing intensity.

Problems Faced in Harvesting, Storage, Packing and Marketing

8.14 The polyhouse growers in Himachal Pradesh also faced the problems related to harvesting, packing/processing, storage, marketing etc. During 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 produce.Most of the respondents (93%) faced the problems of marketing followed by the problems of packing/processing (87%). The farmers did not have access of nearby market to sell their produce. Besides the problems mentioned above, the farmers also reported that polyhouses are prone to damage by heavy rain and storms. Such farmers in the regions suffered losses and they found difficult to reconstruct these due to lack of funds.

Table 8.4 Problems Faced in Harvesting, Storage, Packing and Marketing

(Multiple Responses in%)

Type of problem	Himachal Pradesh	Jammu & Kashmir	Uttrakhand	Sikkim
Harvesting	-		100.00	52.5
Time	29.00		100.00	52.5
Method	31.00		0.00	0.0
Storage	31.00		0.00	72.0
Packing/Processing	87.00		40.85	32.0
Marketing	93.00		100.00	48.0

8.15 Without exception all the sampled farmers in Uttarakhand said that they had faced problem during the time of harvesting while about 41 per cent reported they had marketing issues as well. However, nobody complained about any problem relating to storage or packing and processing.

8.16 In Sikkim 52.5 per cent of the sampled farmers reported they had faced problem during the time of harvesting while about 72 and 32 per cent said they had storage and marketing issues.

Problems in Growing Off-Season Vegetables Outside Polyhouse

8.17 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

8.18 The problems of the growers regarding transportation are given in Table 8.5. About 67 percent of the respondents in Himachal Pradesh stated that vehicles were not available in time, they had to wait for their turn or they had to pay more for quick disposal of their produce. Eighty three percent growers complained about higher transportation charges at the peak season of vegetables.

8.19 Majority of the growers reported that the facilities regarding transportation were not available in time and 75 percent were of the opinion that the transportations charges were high. Twenty five percent of the total sampled farmers reported no problem in this regard (Table 8.5).

Table 8.5 Problems in Availability of Transport

Particulars	Not available in time	Higher charges	Any other	No problem
Himachal Pradesh	66.67	83.33	-	-
Jammu & Kashmir	75.00	78.00	-	25.00
Uttarakhand	87.00	38.00	43.00	41.00
Sikkim	15.83	19.17	6.67	65.83

8.20 In Uttarakhand Majority of the growers (87%) reported that the facilities regarding transportation were not available in time.

8.21 In Sikkim majority of the growers (65.83%) reported that they had no issue regarding transport availability.Further 19.17 percent growers said that the transportation facilities not available in time and they had to pay higher charges for availing transportation facilities.

Problems of Packing Material

8.22 Forty three percent of the sampled vegetable growers In Himachal Pradesh reported about the problem of shortage of packing material. About 53 percent of them complained of high prices of packing material and 27 percent were of the opinion that the packing material was not available in time; twelve percent reported no problem in this regard.

Table 8.6 Problems of Packing Material Faced by Sampled Farmers

(Multiple response %)

Particulars	Shortage	High price	Not available in time	No problem
Himachal Pradesh	43.33	53.33	26.67	11.67
Jammu & Kashmir	70.00	86.67	13.33	70.00
Uttarakhand	67.00	93.00	43.00	11.00
Sikkim	4.17	18.33	12.50	69.17

8.23 More than 86 percent of the sampled vegetable growers in J&K quoted the problems of high prices of packing material of vegetables whereas 70 percent stated about the problem of shortage of packing material. Only 13 percent of them reported that the packing material was not available in time

8.24 Overall 67 per cent of the farmers in Uttarakhand reported shortage of packing material, 93 per cent complained of high prices, 43 per cent complained of their non-availability on time and 11 per cent mentioned about no problems at any end.

8.25 In Sikkim about 69 percent vegetable growers reported about no problem regarding packing of the materials. Further 18.33 percent vegetable growers complained about the higher price of packing materials.

Problems of Storage Facilities

8.26 The main problem regarding storage of produce was found to be in availing of them and whatever be available conditions and adequacy of space were found to be important.

8.27 Over all, majority of the farmers (87%) in Himachal Pradesh reported that they have no storage facility and about 23 percent of the growers stated that they have inadequate storage facilities.

Table 8.7 Problems of Storage Facility Faced by Sampled Farmers

(Multiple response %)

Particulars	No storage facility available	Inadequate storage facility	No problem
Himachal Pradesh	86.67	23.33	-
Jammu & Kashmir	88.33	46.67	-
Uttarakhand	67.00	93.00	43.00
Sikkim	68.33	3.33	28.33

8.28 Majority of the vegetable growers (88%) In Jammu & Kashmir reported that they have no storage facility. About 47 percent of the sampled growers quoted the problem of inadequate storage facilities.

8.29 Ninety three percent of the vegetables growers in Uttarakhand reported about inadequate storage facility. In Sikkim majority of the vegetable growers (68.33%) complained about shortcomings of storage facility.

Problem of Market Intelligence

8.30 Market intelligence plays an important role during marketing of perishables. The prices of produce depend mainly on the market conditions, and proper information

regarding market is considered as an important factor for catching higher 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 8.8.

8.31 Majority (48.33%) of the vegetable growers in Himachal Pradesh reported that they had received late information regarding prices at various markets for their produce. Forty five percent of the farmers were of the opinion that they get information for fewer markets. About 37 and 32 percent of the total sample reported that they got inadequate and misleading information during reporting time.

Table 8.8 Problems of Market Intelligence Faced by Sampled Farmers

(Multiple response %)

Particulars	Late information	Available for few markets	Inadequate information	Misleading information	No problem
Himachal Pradesh	48.33	45.00	36.67	31.67	-
Jammu & Kashmir	46.67	61.67	76.67	53.33	46.67
Uttarakhand	66.00	70.00	72.00	69.00	16.00
Sikkim	20.83	75.00	51.67	16.67	5.83

8.32 Majority (76.67%) of the farmers in J&K reported that they get inadequate information regarding markets while 53 percent of the vegetable growers were of the view that the information received was misleading. More than 61 percent opined that they get market information, but it was for a fewer markets. About 47 percent quoted that generally they got late information regarding the prices announced.

8.33 Majority (72%) of the vegetable growers in Uttarakhand reported that they get inadequate information regarding markets while 69% were of the view that the information received was misleading. About 66% vegetable growers reported they get late information regarding the price announced.

8.34 Majority (75%) of the farmers in the state of Sikkim reported that they get information regarding markets but for fewer markets. Inadequate information (51.67%), late information (20.83%) and misleading information (16.67%) are the important points they raised in various levels.

Problem of malpractices

8.35 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.

8.36 Thirty eight percent of the growers in Himachal Pradesh stated that the commission agents deduct more charges. Thirty percent farmers had reported that payment was unduly delayed and 35 percent told that payments often paid in installments. Forty percent of them that reported multiplicity of charges and 38 percent were of the view that the commission agents also deduct undue charges. According to the majority of the farmers (75%), commission agents quote lower prices than the actual one.

Table 8.9 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
HP	38.33	35.00	30.00	40.00	38.33	75.00	-
J & K	45.00	33.33	23.33	33.33	41.67	36.67	
Uttarakhand	66.00	70.00	72.00	69.00	16.00	66.00	
Sikkim	-	26.67	62.50	-	-	-	23.33

8.37 Thirty three percent each of the farmers in J&K reported that payment is often paid in installments and the charges are taken more than once. More than 41 percent were of the opinion that the commission agents deduct undue charges and about 37 percent said that commission agents quote lower prices than the actual one.

8.38 In Uttarakhand 66 percent of the growers stated that commission agents deduct more charges. Seventy two percent farmers reported that payment was unduly delayed and 70 percent of them reported that payments often paid to them in installments. Sixty nine percent reported multiplicity of charges and 16 percent were of the view that the commission agents also deduct undue charges. According to 66 percent of the farmers commission agents quote lower prices than the actual one.

8.39 In Sikkim 62.50 and 26.67 of the vegetable growers complained about the late and part payment. Further 23.33 percent of them have reported about no problems regarding mal practices are being faced in the markets accordingly.

CHAPTER-9

Conclusions and Policy Implications

9.1 The hilly areas 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. Moreover, with the availability of new technology, it has become much easier for them to overcome the seasonal barriers associated with hill farming making farming more remunerative for them. Indian farmers have traditionally depended heavily on middlemen since major marketing costs are incurred on transport, loading/ unloading etc. Marketing of vegetable crops is quite complex owing to short shelf-life, high seasonality in production and bulkiness. Moreover, the efficiency of vegetables marketing in India has been of significant concern in recent years; on the one hand is high and fluctuating consumer prices and on the other hand producer end up getting only a small share of the consumer rupee.

Main Findings

9.2 In Himachal Pradesh 36.97, 38.09 and 29.24 percent were males, females and children. In Jammu-Kashmir 32.45, 35.31, and 32.24 percent were males, females, and children, whereas in Uttarakhand these percentages were 42.81, 39.06, and 18.13 percent respectively. In Sikkim there were 41.30, 40.42 and 18.28 percent of males, females and children among sampled households. The proportion of children was more in Jammu-Kashmir in comparison to Himachal Pradesh, Utarakhand and Sikkim. Average family size was higher in Utarakhand (9.63 persons) followed by Jammu & Kashmir (8.12 persons), Sikkim (4.74 persons) and Himachal Pradesh (4.73 persons).

9.3 In Himachal Pradesh most of the sampled households (85%) fall in general category and few households belong to scheduled caste (8.33%) and other backward castes (6.67%). In Jammu-Kashmir all sampled households fall in general category, whereas in Uttarakhand 12.30, 47.54 and 40.16 percent of the sampled farmers belongs to scheduled caste, schedule tribe and general category. Further in Sikkim 23.33, 43.33,

23.33 and 10 percent of the sampled farmers belong to scheduled caste, schedule tribe, OBC and general category respectively.

9.4 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 in Himachal Pradesh, Jammu-Kashmir, Utarakhand and Sikkim was observed to be 1.16, 0.22, 0.64 and 1.10 hectares.

9.5 The main source of water for irrigation in Himachal Pradesh, and Jammu & Kashmir was kuhl whereas in Uttarakhand and Sikkim it was tap water, streams and other sources. The main source of drinking water in Himachal Pradesh, Jammu & Kashmir and Sikkim was tap water and in Uttarakhand it was from other sources.

9.6 In Himachal Pradesh, among all the sampled households, 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 maize and wheat crops were most popular in the state. In Jammu & Kashmir, the percentage area under maize and paddy crops has been worked out as 50 percent each. In Uttarakhand wheat is the main crop (23.06 percent) followed by other crops (19.78%), fruits (18.79%), potato (12.48%), maize (8.93%), paddy (7.42%) and barley (1.88%) respectively. **I**n Sikkim potato is the main crop (48.50%) followed by paddy (46.02%) and maize (5.49%).

9.7 Cropping intensity (with fruits) was higher in Himachal Pradesh as compared to Jammu-Kashmir, Uttarakhand and Sikkim. The cropping intensity (without fruits) has been worked out 200, 200, 120 and 139 among the sampled farmers of Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim.

9.8 In Himachal Pradesh, the area under peas was highest (38.62%), followed by cauliflower (23.02%), cabbage (19.17%), beans (18.28 %) capsicum (5.51%) and tomato (1.67%). Among all the sampled farmers in Jammu & Kashmir, the area under cabbage was maximum (37.77%) followed by cauliflower (37.44%), knolkhol (12.97%) tomato (6.24%) and capsicum (5.58%). While in Uttarakhand the area under peas was maximum (35.63%) followed by tomato (21.88%), cabbage (19.89%), cauliflower (13.18%), capsicum (5.13%) and beans (4.28%) respectively. In Sikkim the area under

cabbage was maximum (22.89%) followed by cauliflower (21.53%), peas (15.52%), beans (15.17%) tomato (12.92%) and capsicum (11.97%) respectively.

9.9 In Himachal Pradesh, the productivity of tomato was the 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.). In Jammu & Kashmir, the productivity of tomato was maximum (280 qtls./ha.) followed by cabbage (260 qtls./ha.), knolkhol (260 qtls./ha.), cauliflower (256 qtls./ha.) and capsicum (245 qtls./ha.), whereas in Uttarakhand, the productivity of cabbage was highest (215 qtls./ha.) followed by tomato (211 qtls./ha.), cauliflower (193 qtls./ha.), capsicum (184 qtls./ha.), beans (115 qtls./ha.) and peas (91 qtls./ha.) respectively. In Sikkim, the productivity of capsicum was maximum (496.05 qtls./ha.) followed by tomato (298.85 qtls./ha.), cabbage (240.68 qtls./ha.), cauliflower (234.00 qtls./ha.), beans (133.85 qtls./ha.) and peas (124.00 qtls./ha.) respectively.

9.10 In Himachal Pradesh, tomato cultivation was more profitable followed by cauliflower, cabbage, peas, capsicum and beans. In Jammu & Kashmir, capsicum cultivation was more profitable followed by knolkhol, cauliflower, tomato and cabbage. While in Uttarakhand, cultivation of capsicum was more profitable followed by cauliflower, beans, tomato, peas and cabbage. In Sikkim, cultivation of peas was more profitable followed by beans, cabbage, tomato, cabbage and capsicum.

9.11 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 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 8.45percent.

9.12 The cost of marketing borne by vegetable growers for selling their produce in Jammu market worked out to be Rs.368, Rs.332, Rs. 360, Rs.349 and Rs.353 per quintal for tomato, cabbage, cauliflower, capsicum and knolkhol. Transportation cost was the main component of total marketing cost borne by the producer in all the vegetables marketing due to their distant location. The second important component of marketing cost was the cost of commission and market fee. The share of marketing costs in consumer's rupee was maximum in case of cabbage (14.08%) and minimum in capsicum (10.45%). The share of producer in consumer's rupee was 65.89, 65.83, 63.65, 63.61 and 61.22 percent in capsicum, knolkhol, cauliflower, cabbage and tomato respectively. The mashakhor's margins ranged between 0.83 percent in tomato to 0.99 percent each in capsicum and knolkhol. The retailer's margin was highest in tomato (9.47%) and lowest in cabbage 7.97percent.

9.13 In Uttarakhand, all the vegetables are being sold entirely in one or more of the three major markets of the district itself, namely Joshimath, Gopeshwar and Karna Prayag, which are located at a distance of roughly 60- 80 kms from the polyhouses covered under the study.

9.14 In Sikkim, about 71.1 per cent of capsicum production and 62.2 percent of tomato production is sold to the consumers through FPOs, while about 28.9 per cent and 37.8 per cent of capsicum and tomato is marketed in nearby markets respectively. In the absence of any market fee or commission in the local markets or organic vegetable kiosks, the costs on marketing in nearby markets together account for 7.7 per cent and 7.83 per cent for capsicum and tomato respectively.

9.15 The farmers growing vegetables inside polyhouse have encountered some of the problems as: delayed or lack of information, cumbersome clearance process, unavailability of construction material at the local level, delay in technology transfer, lack of skilled labour, high construction cost. Low quality and high prices of inputs are reported as two major problems by these farmers. Sowing time and irrigation intensity

are some other problems they encountered with respect to cropping practices. All the growers reported that they had problem with the time and method of such farming as well as marketing them. For the without polyhouse vegetables growers, transportation of their produce is a big issue and so are packing and storage. Inadequate storage facility or inadequacy or non- availability of packing material at the time of need are some of the common problems reported by them. Late and partial or misleading information regarding marketing causes detrimental to these farmers. Last but not the least, the problem of malpractice plagued the system as has been reported by the sampled growers. Many of them complained about late payment, part payment, overcharging, undue deductions, and quotation of less than actual prices in the market.

Policy Implications

It is clear from the above that growing off season vegetables outside and inside polyhouse in Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Sikkim has improved the quality of life of the growers by increasing income and employment. However, the profitability of these crops still can be increased 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 are 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.
- The polyhouse growers should be provided quality seeds in time and at the reasonable rates so that the productivity of off season vegetables can be increased by using the seedling raised in polyhouses. Farmers should be encouraged to establish high tech polyhouses as such polyhouses can produce good quality saplings before their expected time.
- Like Sikkim formation of Farmer Producers' Organizations should be encouraged so that the hurdles in post-harvest management and marketing are reduced to the minimum for the marginal and small vegetable producers. Under active state supervision, marketing through FPOs/SHGs can reduce middlemen's commission and keep off other market intermediaries. As members participants, the farmers can themselves act as retailers in government regulated markets and organic kiosks.

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