Study Number – 185

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

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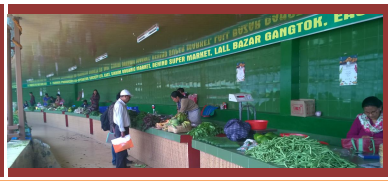

Study sponsored by Ministry of Agriculture and Farmers Welfare
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Agro-Economic Research Centre
(For the States of West Bengal, Sikkim and Andaman & Nicobar Islands)
Visva-Bharati, Santiniketan
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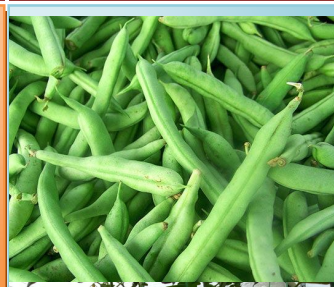

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Preface

The present Study entitled "Economic Analysis of Cost and Return of Off-Season Vegetables with Focus on Poly House Effect in Sikkim" is an All India Coordinated Study was undertaken at the instance of Directorate of Economics and Statistics, Ministry of Agriculture & Farmers' Welfare, Government of India, New Delhi. The task of coordination has been entrusted to Agro-Economic Research Centre, Shimla, Himachal Pradesh..

Production of fresh vegetables before or after their normal growing season can provide higher income and employment to the farmers but also require highly specialized techniques and regular supervision. Risk of pest and disease infestation is also high. However, the benefits are much higher than the costs if it can be managed with modern production technologies. A large number of farmers in Sikkim are already engaged in the cultivation of off-season vegetables under polyhouse cover with organic cultivation technique. Such cultivation proved a remunerative proposition for the resource poor farmers besides generating greater employment opportunities, especially for the female family members. The findings of the study suggests greater emphasis on promoting off-season vegetable cultivation under polyhouse in Sikkim.

The task of completion of this Study was assigned to Kali Sankar Chattopadhyay, Deputy Director-in-charge, Ranjan Kumar Biswas, Dabajit Roy and Ashok Sinha. Drafting and analysis of the report was done by Kali Sankar Chattopadhyay, Ranjan Kumar Biswas, Debajit Roy and Debanshu Majumder. Primary information collected through field survey was done Kali Sankar Chattopadhyay, Ashok Sinha, Vivekananda Datta, Debajit Roy and Ranjan Biswas. The tedious work of data entries and tabulation were done by Debajit Roy, Ranjan Kumar Biswas and Debanshu Majumder. Also, Mr. Rishav Mukherjee voluntarily helped in data entry and tabulation. Typing of the report was done by Munshi Abdul Khaleque and Nityananda Maji. Secretarial assistance was provided by D. Mondal, D.Das, P. Mitra and A.R. Patra. B. Singh and S. Hansda helped in the office maintenances.

We convey our sincere gratitude to the Department of Horticulture & Cash Crop Development (FSOAD), Government of Sikkim, and particularly to Mr. Khorlo Bhutia, Principal Director cum Secretary, Mr. K.T. Bhutia, Addl. Director, Dr. P. Subba, Mr. D. K. Bhandari, Mr. M. B. Subba all Jt. Directors, Mr. Sherop Bhutia and Mr. D. Bhujel, Deputy Directors, and all research and administrative staff for their effective help and cooperation during field survey.

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We are also thankful to Dr. C. S. Vaidya and Dr. Meenakshi Sharma from AERC, Shimla, Himachal Pradesh for their effective coordination of the study. A word of appreciation also to Mr. Ananta Narayan Hazra, Addl Director, Department of Agriculture , Government of West Bengal for his valued opinion and information and finally, we convey our sincere gratitude to the hundreds of villagers and extension workers in the State of Sikkim for their ungrudging responses to our questions for the days together.

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

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Executive Summary

Introduction

Horticultural sector, especially cultivation of off season vegetables in Sikkim is getting prominence for over the periods. However, despite significant contribution of horticulture sector to Sikkim, there is dearth of authentic data related to cost and returns off-season vegetables in the state. The present study deals with the costs and returns of off season vegetables in protected and unprotected cultivation with the following objectives-

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

Sampling design for the study has been divided into two sections.

a) Selection of Area

Keeping in view the objectives of the study, multistage stratified random sampling has been used to identify the sample for the study. In the first stage, two districts viz. East and South from the Sikkim state have been chosen based on highest area under vegetables. Next, one development block from each district, namely, Gangtok from East district and Namchi from South district, has been selected. In the third stage, two vegetable growing pockets/cluster (consisting of three villages) from each block have been identified with the help of officials of department of horticulture. Finally, thirty vegetable growers have been randomly selected from each cluster. These vegetable growers have been selected from each of the four selected clusters by Stratified Random Sampling (SRS) method, maintaining the Probability Proportionate to Size class (PPS). Thus, the samples become representative of the actual proportion of all the four strata of the vegetable growers in the respective

clusters. The study covers 120 vegetable growers for six vegetables, viz. peas, cabbage, cauliflower, French bean, tomato and capsicum. In case of farms growing vegetables under polyhouse cover, it should be noted that all farms belong to small category (less than 250 mt^2).

Major Findings

i) Area under pea's production is higher in North-Sikkim followed by cabbage, beans, tomato and cauliflower. Area under capsicum production in North-Sikkim is virtually negligible. In case of district level production, peas in East-Sikkim and tomato in South-Sikkim has definitely an edge over other crops.

ii) District wise productivity data shows barring tomato, productivity trend for all crops in other districts are more or less similar. Productivity of tomato in North-Sikkim is higher than State average. We find a general resemblance in trend in productivity of peas, cabbage, cauliflower, beans and capsicum also.

iii)The farmers are mostly engaged in agricultural activities and grabbed agriculture as the source of their livelihood, while only a negligible portion among marginal farmers (1.8 per cent) is engaged in other occupation. However, educational standards of farmers are good.

iv) Average family size of the farmers is more or less normal. The overall distribution of workforce of male and female within the age group 16-60 years in East-Sikkim is evenly poised, but in case of agricultural labour category, within small farmers the female dominates over the male labourers.

v) ST, SC and OBCs have dominated the sample pool respectively with their corresponding presence in relation to overall sample size. Only 10 per cent of sample households belong to the general category.

vi) Average holding of cultivated land stands at 1.69 acres per farm. The leased in or leased out phenomenon in both of the districts found among marginal category of farmers only.

vii) Irrigation works in these two districts are mainly done by stacked waters of small rivulets or streams and distributed through polythene pipes to the crop

fields. Approximate distance for carrying water for irrigation from source ranges from 1.22 km to 2.53 km.

viii) Cropping intensity among marginal farmers in South-Sikkim is 143.55. In East-Sikkim, the corresponding figure is 135.40. Besides vegetables, paddy and potato contribute a lot in the sowing calendar though figure of maize is very small.

ix) The relative costs on components like bullock labour, seed, manure, depreciation on farm machinery and interest on working capital reveal similar figure for both marginal and small farmers. It is important to note that imputed value of family labour for vegetable cultivation in general had been around two-third of total cost for all the vegetables.

x) Pattern of cost structure clearly indicates that the marginal farmers use more family labour for vegetable cultivation than small farmers do. Marginal farmers, being faced with resource crunch, generally are not in a position to employ more hired labour for crop enterprise in comparison with their small counterparts.

xi) Net return over total cost (Cost C) had also been higher among the marginal farmers in comparison with the small cultivators with variations across districts and farming classes.

xii) Input-output analysis revealed the fact that in terms of per acre returns from off-season vegetables remained a lucrative proposition. However, at the same time it has to be kept in mind that the data pertaining to all cost and return figures relate to per acre estimate. The small and marginal farmers, though reaping benefits of vegetable cultivation, might not be gaining fabulous amounts due to small scale of operation.

xiii) The growers generally try to reap maximum benefit from small piece of land. Hence, in cases there might have been over optimal use of cheap resources – mainly family labour – in course of the crop enterprise. Therefore, in cases the production process crosses the efficiency frontier.

xiv)A noteworthy feature of East as well as South-Sikkim is that to facilitate marketing of vegetables, FPO (Farmers-Producers-Organization) has been formed,

who take the major responsibility in marketing of output. The vegetable output of the sample farmers are mostly marketed through the FPOs.

xv) Vegetables are mostly marketed in the local markets only, as most farmers sell their output to FPO (Farmer Producers' Organization) to ensure efficient marketing mechanism, whereas the FPOs sell their output in the local markets. 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.

xvi) Among all six vegetable crops selected for the study, tomato records the highest total loss as proportion to total production, followed by losses in capsicum. Total losses for cabbage and cauliflower come out to be 2.20 per cent and 2.41 per cent of production respectively, while that for peas and French beans stand at 2.01 percent and 1.51 per cent respectively.

xvii) On the part of the expenses incurred by the vegetable growers to bring their products up to the market, 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. 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. However, there is no market fee, commission, tax, octroi, etc. in case of marketing of their vegetables for the vegetable growers.

xviii) All the polyhouse structures have been constructed with 100 per cent subsidy by the government. Beneficiaries under the MIDH scheme had to provide land only for the polyhouse, while the contractors on behalf of the government do the rest.

xix) In case of costs of cultivation of capsicum (and tomato) in polyhouse, it can be observed that harvesting of capsicum (and tomato) involves greater costs as compared to other production costs, followed by intercultural practices and seedling/sapling. As Sikkim is the first organic state to be declared by the central government, and no chemical fertilizers or pesticides are being used, the major input

for soil health is application of manure, which is cheap and readily available with the farmers.

xx) As the vegetable growers small in size of operation (100m^2 and 200m^2 of polyhouse cover), the use of hired labour is extremely low. Costs of cultivation for both capsicum and tomato under polyhouse cover stand less than Rs.2500/- per polyhouse.In case of capsicum, net return stands quite high at Rs.23,619/- on the whole. Though a cost of production and marketing is higher for capsicum, a higher net return compensates the costs for capsicum cultivation as compared to cultivation of tomato.

xxi) As construction of polyhouse has been entirely sponsored and shouldered by the state government under provisions of benefit under MIDH scheme, the vegetable growers did not have to face any problem in the construction of polyhouse. The only problem as stated by the vegetable growers is that the contractor unduly delayed the construction of polyhouse. While the farmers do not complaint on non-availability but there is a strong objection regarding quality and price of inputs available.

xii) Only a few of the sample farmers face problems in transport include higher charges of transport (19.1%) and non-availability of vehicles for transport on time (15.8%). As also, a majority of sample farmers do not have much problem with availability of packing material but there is no storage facility available for their vegetable output.

Policy Implication:

- As Sikkim has the favourable climatic conditions for growing vegetables, flowers and horticultural crops, policies like MIDH should be obviously help augment growth in agriculture, especially in hilly regions of Himalayan like Sikkim with proactive state cooperation. Hence, *the policy makers should consider allocating a higher budget* for these states or implement similar schemes in vegetables, floriculture and horticulture.
- Cultivation of vegetables under polyhouse cover in organic cultivation technique comes out to be a remunerative proposition for the resource poor

farmers also, generating greater employment opportunities for marginal farmers, especially for the female family members. As such, *steps to promote off-season vegetable cultivation under polyhouse cover should be taken up, so that the redundant labour force can be optimally utilized* in agriculture at large.

- As in 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 - I

Introduction

Introduction

1.1 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.

1.2 Sikkim has entered upon an era of intensive development after the historic constitutional change of April 1975 through which the State joined the mainstream of national life, becoming the 22nd State of Indian Union. The government has decided to adopt the policy of growth with sustainability, making horticulture a priority sector for higher income generation to farming community as well as to concentrate more on securing maximum crop production of agricultural crops and managing primary agro-resources like soil, water and bio-diversity. Integrated farming, an ideally suited system, is commonly followed by farmers in the State, and which fits well in the developmental process of making Sikkim an organic state. 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.

1.3 The strategy opted for agriculture and horticulture development in Sikkim is to enhance productivity and to sustain the major production systems through proper management of resources. The effort is to establish ecologically sustainable, economically profitable and resource efficient cropping systems along with generation of employment to achieve a positive looking transformation. The concern envisages to integrate participation of women in agriculture development and to incorporate components of research, production, post harvest management, processing, value addition and marketing in a holistic manner. Besides the Government support, Food Security & Agriculture Development Department and Horticulture & Cash Crops Development Department now look forward to institutional and private sector support as well as to mass participation in the growth process of agriculture and horticulture in Sikkim. Different Five-Year Plans envisages addressing on the various sectors of strengths and weaknesses pointed out by the two historic documents "Sikkim the People's vision" and "Sikkim Human Development Report" released recently by the Government of Sikkim. The Horticulture Sector has established its importance in improving land use, promoting crop diversification, generating employment and above all providing nutritional security to the people. Horticulture also encompasses every aspect of aesthetics, economics and environmental regeneration.

1.4 However, in spite of significant contribution of Horticulture Sector to Sikkim state's economy of North Eastern Region, there is dearth of authentic data related to cost and return in this sector. Therefore, collection of proper and accurate data on cost and return of off season vegetables in protected and unprotected cultivation of some important horticulture crops of the Sikkim state becomes extremely important for further development of the said sector.

Demography of the State Sikkim

1.5 The Sikkim census of 2011 says population of Sikkim is the least in all of India. This thinly populated state has a population of mere 6 lakh, and has grown by approximately one lakh since the last census. The state of Sikkim is also the second smallest state in India, and thus, the population density here isn't as low as expected it to be. The density is less than 100 in Sikkim, and has undergone significant increment. The population growth rate is another factor indicating the population status. In Sikkim, the growth rate of population has considerably reduced to just above 10%. Percentage of literates however, has increased by about 20%, which is a huge leap toward progress. Increase in female literacy also tells an optimistic story. The gender ratio in Sikkim is quite alarming, and has not shown significant increase in last 10 years. It shows only around 800 females for every 1000 males. As with most north eastern states in India, the land has not been developed largely. Hence, only over 20% of the population of Sikkim lives in cities. The capital city Gangtok is also the largest one in Sikkim. Population growth in urban and rural areas shows too contrasts a picture. While, city population is growing at an alarming rate of above 150%, the rural population isn't growing at all, but is decreasing. The capital city which is also the largest city in the state of Sikkim is Gangtok. The languages spoken in the Sikkim state includes Nepali, Bhutia, Lepcha, Limbu, Newari, Kulung, Gurung, Manggar, Sherpa, Tamang and Sunwar. In total Sikkim (SK) state comprises 4 districts, namely, East, West, North and South. The ISOCODE assigned by International Organization for Standardization for Sikkim state is SK.

Profile of the State Sikkim

Geography and geology

1.6 Sikkim is located between 27^{o} 04'46" and 28^{o} 07' 48" North latitude and between 88^{o} 0' 55" and 89^{o} 55' 25" East longitude in the eastern Himalaya, bounded between three international borders of China, Bhutan and Nepal on the north, east and west sides, respectively and southern boundary by Darjeeling district of West Bengal state.

1.7 Sikkim with geographical area of 7096 km^2 is surrounded almost on all sides by steep mountain walls, except in south where it is open by Teesta river. High

mountains of north are always covered under perpetual snow cover. Teesta and Rangeet are the major rivers, which originate from the glaciers and drain the water of the state. The altitudes vary from 300 metre to 8586 metre and on the basis of physiography, the whole state can be divided into 6 physiographic zones; summits and ridges, side slope of hills, narrow valley, cliff and precipitous slope, zone of glacial drift and perpetual snow cover.

Table 1.1: Population of Sikkim in last two Censuses (2011 & 2001)

Description	**2011**	**2001**
Approximate Population	6.07 Lakh	5.41 Lakh
Actual Population	607,688	540,851
Male	321,661	288,484
Female	286,027	252,367
Population Growth	12.36%	32.98%
Percentage of total Population	0.05%	0.05%
Sex Ratio	889	875
Child Sex Ratio	944	938
Density / km^2	86	76
Density / mi^2	222	197
Area km^2	7,096	7,096
Area mi^2	2,740	2,740
Total Child Population (0-6 Age)	61,077	78,195
Male Population (0-6 Age)	31,418	39,842
Female Population (0-6 Age)	29,659	38,353
Literacy	82.20 %	68.81 %
Male Literacy	87.29 %	77.38 %
Female Literacy	76.43 %	59.63 %
Total Literate	449,294	318,335
Male Literate	253,364	189,060
Female Literate	195,930	129,275

1.8 The entire state is a young mountain system with highly folded and faulted rock strata at many places. The daling group of rock is found in the central part of Sikkim and composed of phyllites, schists, slates and quartzites. The northern central part of West Sikkim chiefly made up of Darjeeling gneiss. The gneiss of South Sikkim is

highly micaceous and frequently passes into mica-schists. The younger Gondwana contains sandstone, shale, and carbonaceous shale with occasional thin coal bands.

Table 1.2: Population of Sikkim in Rural and Urban area (as per 2011 Census)

Description	Rural	Urban
Population (%)	75.03 %	24.97 %
Total Population	455,962	151,726
Male Population	242,122	79,539
Female Population	213,840	72,187
Population Growth	-5.20 %	153.43 %
Sex Ratio	883	908
Child Sex Ratio (0-6)	952	917
Child Population (0-6)	47,038	14,039
Child Percentage (0-6)	10.32 %	9.25 %
Literates	326,398	122,896
Average Literacy	79.82 %	89.26 %
Male Literacy	85.42 %	92.94 %
Female Literacy	73.42 %	85.19 %

Climate and vegetation

1.9 Climatically, Sikkim experiences variable temperature with scorching summer at the foothills to freezing chills in winter on high mountains. Rainfall occurs throughout the year and state as a whole gets 80-90% of the annual rainfall (except around 65% in north-east) during monsoon (May to September). The mean annual rainfall varies from 840 to 5000 mm with heavy precipitation of snow on the higher reaches and the Greater Himalayas.

1.10 All the botanical zones from tropical to alpine are found in Sikkim due to its geographical position, climate and altitude. The vegetation of Sikkim has been distinguished into 6 forest zones based on altitudes (Khoshoo, 1992). They are (1) Tropical Evergreen Forests (up to 900 metres), (2) Sub-tropical Forests (900-1800 metres), (3) Temperate Forests (1800-2700 metres), (4) Sub-alpine Forests (2700-3500 metres), (5) Alpine vegetation (3500-4500 metres), and (6) Alpine deserts (> 4500 metres). Sikkim is renowned for its Rhododendrons and orchids and for high altitude

Primulas, Meconopsis and Blue poppies. This state is veritable storehouse of medicinal and economically important plants.

Land elevation and land use

1.11 On the basis of elevation, the different places of Sikkim are roughly divided into four zones. The places lying in the altitudinal ranges between 270 to 1500 metres is categorized as Lower Hills. Places between 1500 to 2000 metres are known as Mid Hills, between 2000 to 3000 metres as Higher Hills and places lying above 3000 metres with sparse vegetation are categorized at Alpine Zone.

1.12 The land use pattern of Sikkim is strongly influenced by the elevation, climate and mountainous terrain, especially in the field of agriculture and forestry. Forest is the main land use in the state and nearly 40% (reserve + private) of the geographical area is under varying forest densities cover followed by alpine barren land, snow and glaciers. The cultivated land is approximately 11.13 % of the total geographical area (776.74 km^2) and is confined to altitude less than 2000 metres. Around 70% of the cultivated land (54144 ha) is terraced / semi-terraced and remaining is under fallow / scrub.

Soil profile

1.13 The soils of Sikkim are generally acidic, p^H ranging from 4.3 to 6.4 with mean value of 5.35. The soil texture is silty to clay loam with depth varying from a few inches to several feet. Organic matter content is high with a mean value of 2.74%.

Economic profile

1.14 The economy of Sikkim is traditionally agrarian based on agriculture and animal husbandry. However, with the pace of development, opportunities have sprung up in other tertiary sectors, mainly tourism. It is estimated that less than 11% of the total geographical area is under agriculture. The contribution of agriculture sector to the total GSDP is diminishing, currently accounting for 16.30%.

Horticulture profile

1.15 Horticulture is one of the major economic activities of the people of Sikkim. Large Cardamom, Ginger and Turmeric are the principal crops while Mandarin

Orange, Guava, Mango, Banana and so on are the principal fruits grown in the state. The department of Horticulture is deeply involved in motivating and providing technical guidance to local farmers. Sikkim is also a paradise for flowers. Gladiolous, Anthuriums, Lilliums, Primulas, Rhododendrons, Orchids as well as many other floral species thrive here. The state is home to an amazing 450 species of exotic orchids alone. There is immense potential for developing floriculture on a commercial basis here, and the department of Horticulture is making concerted efforts to turn this sector into an export-oriented industry.

1.16 Horticulture crops play a unique role in Sikkim as well as in India's economy by improving the income of the rural people. Cultivation of these crops is labour intensive and as such they generate a number of employment opportunities for the rural population. Fruits and vegetables are also rich source of vitamins, minerals, proteins, carbohydrates, etc. and are essential in human nutrition. Hence, these are referred to as protective foods and assumed great importance as nutritional security of the people. Thus, cultivation of horticultural crops plays a vital role in the prosperity of a nation and is directly linked with the health and happiness of the people.

1.17 Fruits and vegetables are not only used for domestic consumption and processing into various products (Pickles, Preserves sauces, Jam, Jelly, etc.) but also substantial quantities are exported in fresh and processed form, bringing much-needed foreign exchange for the country. These groups of crops also provide ample scope for achieving bio-diversity and diversification to maintain ecological balance and to create sustainable agriculture and can make an impact on the state as well as the national economy in the years to come.

1.18 It is estimated that India has 240 million acres of cultivable wasteland, which is lying idle, which can be brought under orchard crops without curtailing the area under food crops. The country has abundant sunshine through the year, surplus labour and widely varied agro-climatic conditions, which offer high potential for successful and profitable commercial horticulture.

1.19 Having realized the facts the farmers of Sikkim have been encouraged continuously through *Kisan Mela*, etc by the Horticulture and Cash Crop Department of Government of Sikkim towards horticulture sector which is one of the most profitable sectors owing to its market in and outside the state. This type of *Mela* exhibits horticulture products from the farmers of the state. Such *Mela* besides encouraging the farmers in agricultural and allied activities helps in developing cordial relationship between department and the farmers which in the long run helps in the development of agriculture/horticulture in the state. The *Kisan Mela* is being organized to aware the farmers about new technology and technique of farming in easier ways, which is a sustainable profession and never goes in loss.

1.20 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 on Off-season Vegetable Production and Use of Greenhouse/ Polyhouse Technology

1.21 "'Off-season' is a relative term wherein, the vegetable are grown in an agro-climatic zone in open fields under favorable environment conditions but marketed in an area where the environment is not conducive for their cultivation at that point of time"[1]. There are areas in a country that have comparative advantages of growing vegetables over other areas. Especially in India, with varied agro-climatic specificities across the states, there are ample opportunities for the enterprise. Moreover, with development of Greenhouse/Polyhouse technology the prospect of such cultivation under protected conditions is gaining importance.

1.22 "Greenhouse technology is the technique of providing favourable environment condition to the plants. It is rather used to protect the plants from adverse climatic conditions such as wind, cold, precipitation, excessive radiation, extreme temperature, insects and diseases. It is also of vital importance to create an ideal micro climate around the plants."[2]

Advantages of Greenhouse

- Yield may be many folds higher than the field crops depending upon the environmental control facilities.
- Suited for vegetable and flower cultivation.
- Year round production of floricultural crops.
- Off-season production of crops.
- Efficient utilization of resources including water.

1.23 This method of cultivation is very popular worldwide. In USA vegetable cultivation under greenhouse is found increasing rapidly. In Canada too, cultivation of crops like Tomato, Capsicum and Cucumber is increasing under greenhouse conditions. In European countries like Spain and Netherlands both flower and vegetables are being grown under controlled conditions of greenhouse. In Asia, countries like Japan and China are largest user of greenhouse for vegetable and flower production. In India, however, greenhouse technology started as late as during 1980's. In recent years it has become popular throughout the country for cultivation of vegetables and flowers.

1.24 In the Indian context, "Himachal Pradesh, among all the hill areas of the Hindu Kush – Himalayan Region, is looked upon as a model for development, where gains of scientific research have percolated to the scattered fields over a vast and undulating terrain. …. In several parts of Himachal Pradesh, which is an important constituent of the Western Himalayan Region, the agro-climatic conditions are conducive to the production of off-season vegetables. Capsicum, tomatoes, peas, beans, cole crops and cucumbers are the important vegetable crops being successfully grown in the State…"[3]

1.25 From the study of off-season vegetables Tiwari concludes that "Returns per hectare from competing crops and the off-season vegetables under study indicated that off-season vegetables are giving higher returns than the food crops grown by the farmers of the area." [4]

1.26 Moreover, he finds that "cultivation of off-season vegetables on commercial scale generates more employment opportunities for the farmers of the hilly areas than the cultivation of cereals and a number of other crops."[5]

1.27 Though, off-season vegetable cultivation is quite lucrative in terms of their returns, nonetheless, it has its own problems. Since, the vegetable crops are more responsive to climatic conditions and require continuous care including irrigation water and critical inputs as compared to other crops, they need utmost attention in the production process. Off-season vegetable growers are faced with the problems of unavailability of crucial inputs like fertilizers, insecticides and quality seeds in time and at a fair price. In most of the cases they have to depend on local private agents for such inputs who charge more for the required inputs. Lack of technical know-how about the chemical or organic technology is also partially responsible for non-attainment of desired goal. Apart from these, there are problems of marketing in the face of growing exploitation by the private traders and middlemen.

1.28 According to AK Sharma, "in most nurseries, adverse ecological conditions and pest damage are among the major factors responsible for poor seedling performance"[6].

1.29 Manish Kumar[7], however, has dealt with the use of protected structures and identified its advantages in breeding and seed production of vegetables.

- Mass scale multiplication of micro propagated and genetically modified vegetable crops.
- Handling of important germplasm.
- Creation of special conditions.
- Maintaining smaller breeding populations.
- Special purpose breeding especially for drought, heat tolerant or cold tolerant.
- Maintenance and multiplication of self-incompatible lines.

Off-season Vegetable Cultivation and Polyhouse Structures in Sikkim

1.30 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.

1.31 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.

1.32 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 has evolved into one of the most effective inputs for flowers and vegetables"[8].

1.33 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"[9]

1.34 "Traditional vegetables like pea and beans have always remained our 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"[10].

1.35 "Despite the adoption of available technologies and recommended package for crop cultivation, there always exists the potential yield gap between the farmer's field and the research station. The findings revealed that highest percentage of respondents (86%) perceived the bio-physical constraints- the pest incidence followed by inadequate irrigation facilities (66.7%), weed problem (60%), High cost of seeds (53.3%), Lack of quality seeds (46.7%) and Non-availability of improved seeds (43.3%), Labour scarcity and high labour wages, non-availability of credit, low market value, non- availability of suitable inputs as the major socio-economic constraints. Amongst the technological constraints, lack of confidence, Lack of knowledge, Lack of suitable technologies and Lack of technical backstopping were the major constraints. Non availability of crop insurance, Lack of marketing facilities, adequate extension personnel, insufficient training programme and weak extension system were perceived as the major institutional constraints."[11]

Need of the Study

1.36 Despite impressive development in horticulture sector in recent years, there is a general feeling that data-base of horticultural crops is not comprehensive and reliable in the country. The situation is still worse in the case of NE region and Himalayan states (11 states). This poses a serious problem in understanding the real development of horticulture sector in these states. Besides, there is no systematic data on some marginal and minor horticultural crops in these states. To fill this gap, it is necessary to identify the methodology followed in collection of horticultural statistics, identify problems faced in data collection of horticultural crops by various agencies and take some remedial measures in order to make data on horticultural sector more scientific and factual. The present study makes an attempt in this very direction with a focus on North-East and Himalayan states. The study intends to collect data on cost and returns for some selected villages from the state agencies collecting such data and then do the verification from the concerned households through primary survey. The primary village level survey will verify the discrepancies of the data collected by different agencies of horticulture crops. This will help to highlight changes required at the policy level in the process of data collection of horticultural commodities and to improve the data collection process at various levels. This will help policy makers in the Centre and States to chalk out a programme for further development of the sector.

Objectives of the Study

1.37 The study has been conducted in Sikkim, one of the northern Himalayan states in India with the following specific objectives.

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

1.38 In Sikkim, however, off season vegetables are grown in polyhouses too, we had additional objectives for this particular study.

- 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.

Chapter - II

Methodology

Sampling design

2.1 Sampling design for the study has been divided into two sections. These two sections are:

- Selection of Area, and
- Selection of vegetable growers (Farmers)

Selection of Area

2.2 Keeping in view the objectives of the study, multistage stratified random sampling has been used to identify the sample for the study. In the first stage, two districts from the Sikkim state have been chosen on the basis of highest area under vegetables. These two selected districts are East district and South district. In the next stage, one development block from each district, namely, Gangtok from East district and Namchi from South district, has been selected on the basis of highest area under vegetables. In the third stage, two vegetable growing pockets/cluster (consisting of three villages) from each block with the help of officials of department of horticulture have been identified. Finally, thirty vegetable growers have been selected randomly from each clusters.

Selection of vegetable growers (Farmers)

2.3 In this phase of sampling, attempt has been taken for selection of sample vegetable growers in the study area. At the first step, the lists of total vegetable growers of the four selected clusters of villages have been collected. Then the farmers have been stratified separately for each cluster in to three standard size categories based on operational holding, which are as follows:

- Marginal farmer, having total operational holding up to 1.00 ha
- Small farmer, having total operational holding of 1.01 ha to 2.00 ha
- Medium farmer, having total operational holding above 2.00 ha

2.4 With the help of officials of the Horticulture department, Government of Sikkim, categorization of existing vegetable growers of the selected clusters has been done . The point is to be noted here that there are no existence of any medium farmer by size of operational holding in the study area. So, according to operational holdings, all the vegetable growers have been divided first into two groups for each cluster separately. Then 30 vegetable growers have been selected from each of the four selected clusters by Stratified Random Sampling (SRS) method, maintaining the Probability Proportionate to Size class (PPS). Thus, the samples become representative of the actual proportion of all the four strata of the vegetable growers in the respective clusters. Thus, the study has been based on a sample of 120 vegetable growers in the state Sikkim.

Table 2.1: Selection of Area

District	Block	Vegetable pocket	Village	Selected farmers
East	Gangtok	I	Largow bari	10 (M-9 + S-1)
			Sazong Rumtek	10 (M-9 + S-1)
			Upper Syari	10 (M-10 + S-0)
		II	Assam Linzey	10 (M-8 + S-2)
			Basilekha	10 (M-9 + S-1)
			Daragaon	10 (M-9 + S-1)
Sub-Total				**60** (M-54 + S-6)
South	Namchi	I	Kamrang	10 (M-10 + S-0)
			Perbing Khop	10 (M-10 + S-0)
			Lower Kamrang	10 (M-10 + S-0)
		II	Jaubari	10 (M-9 + S-1)
			Perbingtar	10 (M-8 + S-2)
			Upper Ghurpisey	10 (M-9 + S-1)
Sub-Total				**60** (M-56 + S-4)
Total				**120** (M-110 + S-10)

Source: *Field Survey with the assistance of Govt. officials*

Crops studied

2.5 Six vegetables, viz. peas, cabbage, cauliflower, French bean, tomato and capsicum have been selected in Sikkim for the study.

Markets studied

2.6 For the marketing of off-season vegetables produced in Sikkim, District and Sub-Divisional markets are important for each study district. These two markets have been purposely selected for the study in Sikkim.

Cost concept used

2.7 The standard concept of cost 'C' of the individual crops has been worked out as follows:

Cost A_1

- Hired human labour wage:
- Bullock labour wage:
- Hired machinery charges:
- Cost of seeds / seedlings:
- Cost of fertilizers:
- Cost of manures:
- Cost of insecticides & pesticides:
- Cost of bio-pesticides:
- Irrigation charges:
- Interest on working capital: It has been calculated on the basis of interest on agricultural loan for Kisan Credit Card (KCC) holder and the rate is 4% per annum i.e. Rs. 3.33 per 1000.00 rupees per month.
- Land revenue & taxes: It is nil for small & marginal farmers at present rules of the Government.
- Depreciation on farm implements & machinery: It has been calculated on the basis of an assumption of Rs. 1.25 per crop duration.
- Miscellaneous expenses:

Cost A_2

Cost A_1+ Rent for leased in land:

Cost B_1

Cost A_2 + Interest on fixed capital: It has been calculated on the basis of an assumption of @ 4% per annum, i.e., Re. 1.00 per crop duration.

Cost B_2

Cost B_1 + Rent for own land: It has been calculated on the basis of rent for leased in land prevailing at the study area during the period of 2015-16 and it is as follows:

- Rs. 2627.12 per acre for the crop duration of 3 months in Sikkim state. It is a weighted average of rent received and paid for leased-in and leased-out land respectively.

Cost C

Cost B_2 + Imputed value of family labour:

Data collection

2.8 The 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. The tabular method of data analysis has mainly been used in the study.

Classification of sample

2.9 The standard classification of farmers as marginal and small has been used for the present study for crops grown outside polyhouse cover. It has been found that the study area is dominated by around 90% marginal and 10% small farmers in each block of two districts of Sikkim. So, as per Stratified Random Sampling (SRS) method, maintaining the Probability Proportionate to Size class (PPS), all the farmers have been divided first into two groups, viz. marginal and small in each village of the study area. In the next stage, for selecting 60 respondents from Gangtok block of East district, 90% marginal and 10% small farmers have been selected randomly, taking 9, 9 and 10 marginal and 1and 1 small farmers from Largow bari, Sazong Rumtek and Upper Syari village respectively for Vegetable pocket-I of Gangtok block of the study area. Point to be noted here that there is no existence of small farmer in Upper Syari village. So, 10 marginal farmers have been selected randomly from this village. The farmers for Vegetable pocket-II of Gangtok block have been selected by 8, 9, and 9 marginal farmers and 2, 1 and 1 small farmer from Assam Linzey, Basilekha and Daragaon village respectively depending upon the proportional

existence of respective farmers in the villages. Thus, a sample of 54 marginal and 6 small farmers from 6 villages of 2 clusters has been formed from East district. Turning to South district, it has been found in three selected villages of Vegetable pocket-I, namely, Kamrang, Perbing Khop and Lower Kamrang that there have no any small farmers in these areas. So, 30 marginal farmers, taking 10 from each village randomly, have been selected for the study as these villages are fully dominated by marginal farmers. In this circumstance, for maintaining 90% marginal and 10% small farmers in the selected sample of Namchi block, 9, 8 and 9 marginal farmers and 1, 2 and 1 small farmers have been selected randomly depending upon the proportional existence of respective farmers in Jaubari, Perbingtar and Upper Ghurpisey villages respectively for formation of Vegetable pocket-II sample. Thus, a sample of 56 marginal and 4 small farmers from 6 villages of 2 clusters has been formed from South district. Finally, a sample of 110 marginal and 10 small farmers have been formed for the study in Sikkim state.

2.10 However, in case of farms growing vegetables under polyhouse cover, it should be noted that all farms belong to small category (less than 250 mt^2), particularly as the present survey has not come across any farm with more than 200 mt^2 of polyhouse cover.

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

Category	Districts		All
	East	South	
Marginal (up to 1 ha.)	54 (90.0)	56 (93.3)	110 (91.7)
Small (1-2 ha.)	6 (10.0)	4 (6.7)	10 (8.3)
Medium (above2 ha)	0 (0.0)	0 (0.0)	0 (0.0)
All	60 (100)	60 (100)	120 (100)

Source: *Field Survey* Note. *Figures in parenthesis denote percentages.*

Analytical Tools

2.11 In general, to make the analysis simple and more understandable, tabular analysis has been used.

2.12 To examine the comparative economics of cost and return of selected vegetable crops cultivation under protected and unprotected system in the study area, the cost and return analysis have been worked out for different crops through cost of cultivation as well as cost of production. The computation of cost of cultivation as well as cost of production for 6 vegetable crops in the study area have been worked out following the standard cost concept on the basis of inputs prices of farm production systems prevailing in the study area and prevailed outputs prices in the study area has been used in computation of Return / Cost ratio during the study period, i.e. 2015-16. The formulae followed for these computations are as follows:

$$\text{Cost of Cultivation (Rs / ha)} = \frac{\text{Cost C}}{\text{Operated area in hectare}}$$

$$\text{Cost of Production (Rs / quintal)} = \frac{\text{Cost C + Marketing cost}}{\text{Total production in quintal}}$$

$$\text{Return / Cost Ratio} = \frac{\text{Total output in monetary term}}{\text{Cost C}}$$

$$\text{Net Farm Income (Rs / ha)} = \text{Gross Revenue (Rs / ha)} - \text{Cost C}$$

Farm budgeting technique

2.13 The farm budgeting technique has been used to calculate the cost and returns of different crops produced under protected and unprotected system and the technique employed in this study was the net farm income. This is the prime requirement for financial viability analysis of an enterprise.

Put in the notation form of the Net Farm Income (*NFI*), it is:

$$NFI = GR - TC$$

$$TC = TVC + TFC$$

Where, *NFI*= Net Farm Income (Rs / ha)

GR = Gross Revenue (Rs / ha)

TC = Total Cost (Rs / ha)

TVC = Total Variable Cost (Rs / ha)

TFC = Total Fixed Cost (Rs / ha)

Valuation of inputs and outputs

2.15 To compute various cost of cultivation as well as cost of production and total return in money term, the valuation of different inputs used in the cultivation / production process and the ultimate outputs have been worked out as follows:

Land: Rent for leased in and leased out land is applied / used as per prevailing rate in the study area during the reference period. Similarly, rent for own land has been calculated on the basis of rent for leased in and leased out land prevailing at the study area during the period of 2015 – 16.

Bullock labour: The value has been considered for a pair of bullocks on the basis of average wage rates for a unit area of land prevailing in the study area during the period of investigation.

Human labour: It included the number of man-days employed on the farm for each crop enterprise and then the valuation has been worked out by multiplying the number of man-days with the wage rate paid by the respondents to the hired human labour. The same process and rates have been employed to impute the value for family labour for each crop enterprise.

Seeds, Manures, Pesticides and Irrigation charge: The valuation of these inputs have been worked out on the basis of actual cost incurred for procuring these inputs from the market. The values for owned inputs have been imputed on the basis of market price.

Outputs: The valuation of main and by-products of different crops has been computed on the basis of prices received by the respondent farmers. The same prices has been taken in to consideration for imputing the value of consumed produced by the family.

Gross income: It includes the overall value of marketed and home-consumed main and by-products of crops cultivated by the respondent farmers in the study area.

Net income: It represents the gross income minus total variable cash expenditure of each crop enterprise and imputed value of family labour.

Reference Period

2.16 The study has been conducted in Sikkim for the agriculture year 2015-16.

Chapter - III

Area, Production and Productivity of Vegetables Crops

3.1 Sikkim bears the pride of becoming the first state to declare and adopt organic farming concept in India. The state is blessed by nature in the bounty of resources. Diverse agro-ecological situation ranging between sub-tropical arid and semi-arid in the lower valleys to alpine in very high elevations reflect one congenial environment for diversified cropping – especially for horticulture diversifications. Over the adoption of organic farming coupled with various Central and State sector schemes for transforming such huge arid or semi-arid land into fertile agricultural base has shown a drastic change in area, production and productivity of vegetables.

3.2 The Centrally sponsored Scheme of Horticulture Mission for North-East and Himalayan States (HMNEH) has been implemented in 2001-02. From April, 2014 onwards, HMNEH has been subsumed under Mission for Integrated Development of Horticulture (MIDH) for holistic growth of the horticulture sector covering fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants and plantation crops. As far as the progress of the above scheme is concerned besides other factors an additional area of 78204 ha. of identified horticulture crops have been brought under this scheme out of which an area of 35418 ha. has been covered under promotion of organic cultivation.

3.3 Blessed with varied agro-climatic conditions the noted major crops produced in Sikkim are cardamom, ginger turmeric, flowers, Sikkim Mandarin, Kiwi, maize, paddy, millets, wheat and off-season vegetables. Among off-season vegetables tomato, peas, cabbage, cauliflower and beans share the most. In the following paragraphs an attempt has been made to analyses the changes in area, production and productivities of the above crops in various districts over the period.

3.4 A district wise pattern of area under different crops shows that area under pea's production is higher in North-Sikkim followed by cabbage, beans, tomato and cauliflower. The district of South-Sikkim more or less reflects the same picture. Area under capsicum production in North-Sikkim is virtually negligible, in South-Sikkim the corresponding figure is 0.24 per cent to the district's total vegetable area.

3.5 In reference to State coverage and in case of tomato South-Sikkim has edge over (37.50 per cent) other compatriot districts. Area under peas' production in West-Sikkim (34.15 per cent) is higher in comparison to other districts. The corresponding figure for North, East and South districts are 13.17, 29.27 and 23.41 per cent respectively. In case of cauliflower East-Sikkim has given higher coverage (34.71 per cent) followed by South (31.35 per cent), West (23.87 per cent) and East-Sikkim (10.66 per cent). In case of beans and capsicum both East and South districts possess higher coverage than other two districts (table-3.1).

Table 3.1. District-wise Area ('000 ha) Under Different Vegetables in the State During 2014-15 (%)

Districts	Vegetables							
	Tomato	**Peas**	**Cabbage**	**Cauliflower**	**Beans**	**Capsicum**	**Other vege-tables**	**Total Area(ha)**
North	0.11 (7.48) {10.58}	0.27 (18.35) {13.17}	0.22 (14.95) {17.32}	0.078 (5.30) {10.06}	0.12 (8.15) {10.34}	0.00 (0.00) {0.00}	0.6735 (45.77) {7.63}	1.4715 (100.00)
East	0.28 (6.27) {26.92}	0.60 (13.43) {29.27}	0.31 (6.94) {24.41}	0.269 (6.02) {34.71}	0.37 (8.28) {31.90}	0.009 (0.20) {30.00}	2.629 (58.85) {29.77}	4.467 (100.00)
South	0.39 (7.67) {37.50}	0.48 (9.44) {23.41}	0.35 (6.88) {27.56}	0.243 (4.78) {31.35}	0.38 (7.47) {32.76}	0.012 (0.24) {40.00}	3.2319 (63.53) {36.60}	5.0869 (100.00)
West	0.26 (6.30) {25.00}	0.70 (16.95) {34.15}	0.39 (9.44) {30.71}	0.185 (4.48) {23.87}	0.29 (7.02) {25.00}	0.009 (0.22) {30.00}	2.2956 (55.59) {26.00}	4.1296 (100.00)
Total Area(ha)	**1.04** {100.00}	**2.05** {100.00}	**1.27** {100.00}	**0.775** {100.00}	**1.16** {100.00}	**0.03** {100.00}	**8.83** {100.00}	**15.155**

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

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

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

3.6 In case of district level production peas in East-Sikkim and tomato in South-Sikkim has definitely edge over other crops.Tthe state level production data shows West-Sikkim produces more cabbage (31.24 per cent) than other three districts. Cauliflower production in East-Sikkim (35.02 per cent) is higher followed by South (31.13 per cent), West (23.7 per cent) and North-Sikkim (10.15 per cent) respectively.

3.7 District wise productivity data shows barring tomato, productivity trend for all crops in other districts are more or less similar. Productivity of tomato in North-Sikkim is higher than State average. One general resemblance in trend in

productivity of peas, cabbage, cauliflower, beans and capsicum is found also. Table-3.3 shows the trend only in case of beans productivity in North-Sikkim (49.17) is higher than State coverage (46.63 per cent).

Table 3.2. District-wise Production ('000 MT) of Vegetables in the State during 2014- 15 (%)

Districts	Vegetables							
	Tomato	**Peas**	**Cabbage**	**Cauliflower**	**Beans**	**Capsicum**	**Other vege-tables**	**Total Prod. (tonnes)**
North	0.88 (11.26) {10.96}	1.15 (14.71) {12.99}	1.21 (15.48) {16.88}	0.428 (5.48) {10.15}	0.59 (7.55) {11.01}	0.00 (0.00) {0.00}	3.558 (45.52) {7.56}	7.816 (100.00)
East	2.12 (8.99) {26.40}	2.60 (11.03) {29.38}	1.75 (7.42) {24.41}	1.476 (6.26) {35.02}	1.72 (7.30) {32.09}	0.0315 (0.13) {30.00}	13.8753 (58.86) {29.47}	23.5728 (100.00)
South	3.06 (11.17) {38.11}	2.08 (7.59) {23.50}	1.97 (7.19) {27.48}	1.312 (4.79) {31.13}	1.75 (6.39) {32.65}	0.042 (0.15) {40.00}	17.1834 (62.72) {36.49}	27.3974 (100.00)
West	1.97 (8.94) {24.53}	3.02 (13.71) {34.12}	2.24 (10.17) {31.24}	0.999 (4.53) {23.70}	1.30 (5.90) {24.25}	0.0315 (0.14) {30.00}	12.4702 (56.60) {26.48}	22.0307 (100.00)
Total Production (tonnes)	**8.03** {100.00}	**8.85** {100.00}	**7.17** {100.00}	**4.215** {100.00}	**5.36** {100.00}	**0.105** {100.00}	**47.0869** {100.00}	**80.8169**

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

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

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

Table 3.3. District-wise Productivity of Vegetables in Sikkim during 2014-15 (Qtls./ha)

Districts	Vegetables						
	Tomato	**Peas**	**Cabbage**	**Cauliflower**	**Beans**	**Capsicum**	**Other vegetables**
North	80.00	42.592	55.00	54.871	49.166	0.00	52.828
East	75.714	43.30	56.451	54.869	46.486	35.00	52.777
South	78.461	43.30	56.285	53.991	46.052	35.00	53.168
West	75.769	43.142	57.435	54.00	44.827	35.00	54.322
State Avg.	**77.49**	**43.08**	**56.29**	**54.43**	**46.63**	**26.25**	**53.27**

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

3.8 Since couple of years the State 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-3.4 reveals that how over the period area under vegetable cultivation has positively

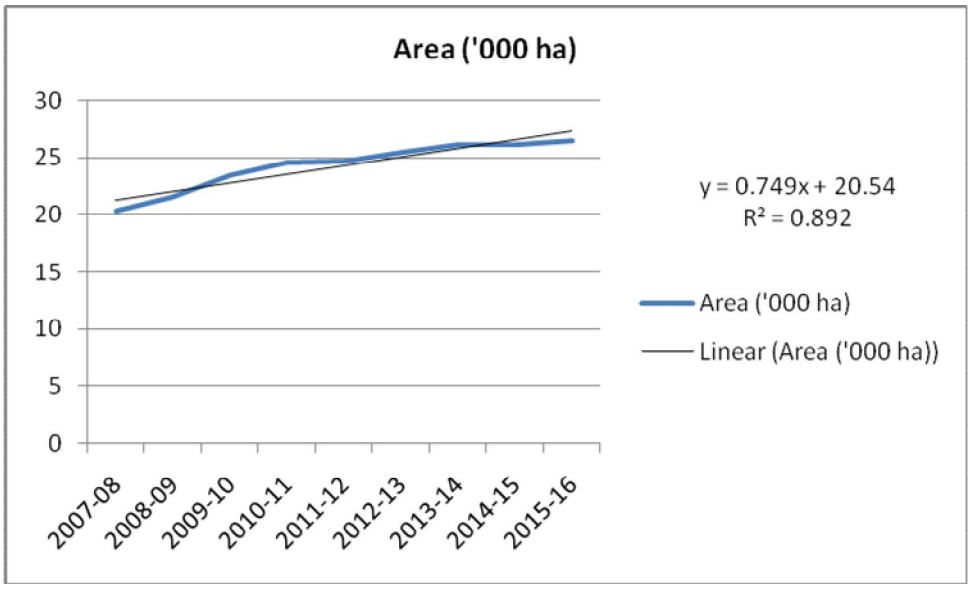
changed. As far as availability of data is concerned we see in the year 2009-10 (taking 2007-08 as base year) the area under vegetable cultivation has significantly changed. Since 2007-08 to 2015-16, the percentage change from the base year estimates to be 30.68 per cent i.e. area under vegetable production has increased from 20,267 thousand hectare to 26,484 thousand hectare, with a CAGR of 3.40 percent. It is a formidable change no doubt.

Table 3.4. Changes in Area under Vegetables

Year	Area ('000 ha)	Year to year percentage change	Percentage change from the base year
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

Fig. 3.1. Trends in Area under Vegetables Production



3.9 Unlike changes in areas, changes in production give an erratic picture, we find from the Table-3.5 shows sorts of ups and downs in production over the years. Obviously that changes might not always have correlated with the change in

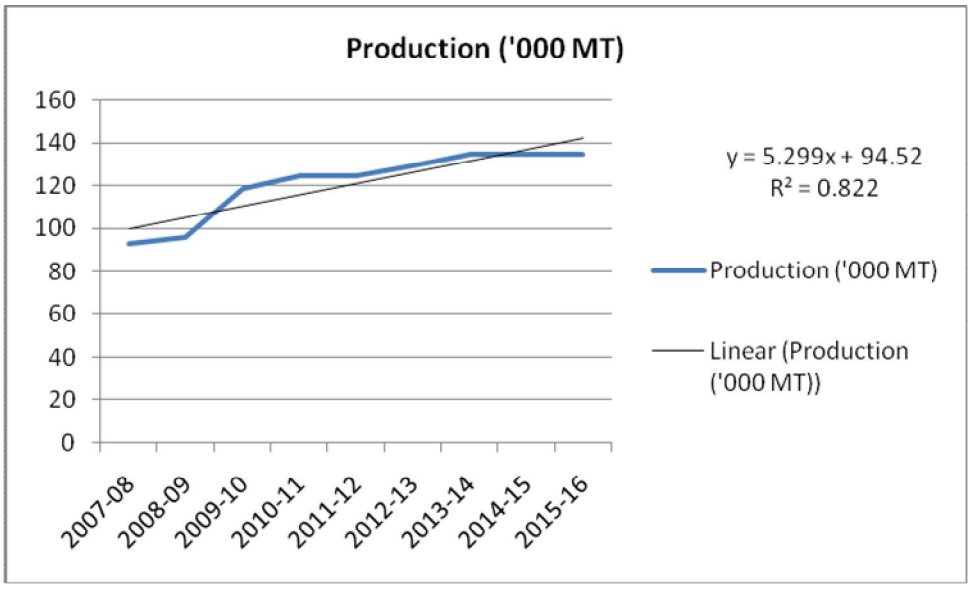
areas, there are definitely others causes of production also. In terms of change in production the year 2009-10 gives a very rosy picture though in 2014-15 a slight fall in production in visible from the table. Nevertheless, the CAGR of production stands at 4.72 percent over the period from 2007-08 to 2015-16.

Table 3.5. Changes in Production under Vegetables

Year	Production ('000 MT)	Year to year percentage change	Percentage change from the base year
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

Fig. 3.2. Trends in Production of Vegetables



Chapter -IV

Socio-Economic Profile of Selected Vegetable Growers

4.1 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 play a decisive factor in augmenting the growth and development of the society.

4.2 As far as occupational structure is concerned almost all farmers, marginal and small (no medium category) in both of East and South-Sikkim districts are primarily involved in agriculture. Only a negligible portion among marginal farmers (1.8 per cent) is engaged in other occupation. This Table-4.1(a) shows how enormously the farmers are engaged in agricultural activities and grabbed agriculture as the sole source of their livelihood.

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

Category	Age of the head				Occupation			
	20-40 yrs.	41-60 yrs.	Above 61 yrs.	Total	Agri.	Non-agri.	Any other	Total
District: East								
Marginal	5.8	39.2	0.0	100.0	98.2	0.00	1.8	100.0
Small	0.0	5.0	0.0	100.0	100.0	0.00	0.00	100.0
Medium	0.0	0.0	0.0	100.0	0.00	0.00	0.00	100.0
All	5.8	44.2	0.0	100.0	98.3	0.00	1.7	100.0
District: South								
Marginal	10.8	35.0	0.8	100.0	98.2	0.00	1.8	100.0
Small	0.0	3.3	0.0	100.0	100.0	0.00	0.00	100.0
Medium	0.0	0.0	0.0	100.0	0.00	0.00	0.00	100.0
All	10.8	38.3	0.8	100.0	98.3	0.00	1.7	100.0
Overall								
Marginal	16.7	74.2	0.8	100.0	98.2	0.00	1.8	100.0
Small	0.0	8.3	0.0	100.0	100.0	0.00	0.00	100.0
Medium	0.0	0.0	0.0	100.0	0.00	0.00	0.00	100.0
All	16.7	82.5	0.8	100.0	98.3	0.00	1.7	100.0

** Source: Field survey* ** Figures in percentages*

4.3 Educational standards in both of these two categories of farmers are fairly good. In East-Sikkim almost 100 per cent of the farmers have gone to the level of Matric and Higher Secondary clubbed together. Interestingly, among marginal farmers 20.4 per cent of them studied up to graduation level. The corresponding figure for South-Sikkim is 8.9 per cent. Overall 50 per cent of the marginal farmers have completed their education up to Matric level.

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

Category	Literacy					
	Up to III	Up to Primary	Up to Matric	Up to HS	Up to Graduation or more	Total
District: East						
Marginal	7.4	9.3	44.4	18.5	20.4	100.0
Small	0.0	0.0	50.0	50.0	0.0	100.0
Medium	0.0	0.0	0.0	0.0	0.0	100.0
All	6.7	8.3	45.0	21.7	18.3	100.0
District: South						
Marginal	16.1	17.9	50.0	7.1	8.9	100.0
Small	0.0	50.0	50.0	0.0	0.0	100.0
Medium	0.0	0.0	0.0	0.0	0.0	100.0
All	15.0	20.0	50.0	6.7	8.3	100.0
Overall						
Marginal	11.8	13.6	47.3	12.7	14.5	100.0
Small	0.0	20.0	50.0	30.0	0.0	100.0
Medium	0.0	0.0	0.0	0.0	0.0	100.0
All	10.8	14.2	47.5	14.2	13.3	100.0

** Source: Field survey * Figures in percentages*

4.4 Average family size of the farmers in both of these two districts is more or less normal, although the average family size among small farmers in South-Sikkim is fairly low than the overall size of the households.

4.5 The overall distribution of workforce of male and female within the age group 16-60 years in East-Sikkim is evenly poised. The district of South-Sikkim bears no significant changes; only in case of agriculture labour category among small farmers, female dominates over their male counter parts.

Table 4.2. (a) Demographic Profile of Sampled Farmers of District East (%)

Particulates	Marginal	Small	Medium	All
Male	41.15	53.85	0.00	42.31
Female	41.54	34.62	0.00	40.91
Children	17.31	11.54	0.00	16.78
Total	100.00	100.00	100.00	100.00
Avg. Family size	4.81	4.33	0.00	4.77
Workers (16-60 yrs.)				
Male	51.54	57.14	0.00	52.08
Female	48.46	42.86	0.00	47.92
Total	100.00	100.00	100.00	100.00
Occupation				
Agri. labour				
Male	51.56	57.14	0.00	52.11
Female	48.44	42.86	0.00	47.89
Non-agri. Labour				
Male	50.00	0.00	0.00	50.00
Female	50.00	0.00	0.00	50.00

** Source: Field survey*

Table 4.2. (b) Demographic Profile of Sampled Farmers of District South (%)

Particulates	Marginal	Small	Medium	All
Male	40.51	33.33	0.00	40.28
Female	39.42	55.56	0.00	39.93
Children	20.07	11.11	0.00	19.79
Total	100.00	100.00	100.00	100.00
Avg. Family size	4.89	2.25	0.00	4.72
Workers (16-60 yrs.)				
Male	51.63	37.50	0.00	50.93
Female	48.37	62.50	0.00	49.07
Total	100.00	100.00	100.00	100.00
Occupation				
Agri. Labour				
Male	51.63	37.50	0.00	50.93
Female	48.37	62.50	0.00	49.07
Non-agri. Labour				
Male	0.00	0.00	0.00	0.00
Female	0.00	0.00	0.00	0.00

** Source: Field survey*

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

Particulates	Marginal	Small	Medium	All
Male	40.82	48.57	0.00	41.30
Female	40.45	40.00	0.00	40.42
Children	18.73	11.43	0.00	18.28
Total	100.00	100.00	100.00	100.00
Avg. Family size	4.85	3.50	0.00	4.74
Workers (16-60 yrs.)				
Male	51.59	50.00	0.00	51.48
Female	48.41	50.00	0.00	48.52
Total	100.00	100.00	100.00	100.00
Occupation				
Agri. Labour				
Male	51.60	50.00	0.00	51.49
Female	48.40	50.00	0.00	48.51
Non-agri. Labour				
Male	50.00	0.00	0.00	50.00
Female	50.00	0.00	0.00	50.00

** Source: Field survey*

Table 4.3. Social Classification of Sampled Farmers (%)

Particulars	Marginal	Small	Medium	All
District East				
SC	42.59	33.33	0.00	41.67
ST	37.04	50.00	0.00	38.33
OBC	5.56	16.67	0.00	6.67
General	14.81	0.00	0.00	13.33
Total	100.00	100.00	100.00	100.00
District South				
SC	5.36	0.00	0.00	5.00
ST	46.43	75.00	0.00	48.33
OBC	41.07	25.00	0.00	40.00
General	7.14	0.00	0.00	6.67
Total	100.00	100.00	100.00	100.00
Overall				
SC	23.64	20.00	0.00	23.33
ST	41.82	60.00	0.00	43.33
OBC	23.64	20.00	0.00	23.33
General	10.91	0.00	0.00	10.00
Total	100.00	100.00	100.00	100.00

** Source: Field survey*

4.6 The demographic profile among all sample farmers [Table-4.2(c)] reveals both male and female within these two categories of farming population are evenly distributed. Only in case of occupational standards in marginal farmer category male labour dominates over female agricultural labour. In case of small farmers the figures for both male and female labour are 50 per cent each.

4.7 The social classification of the sample farmers (Table-4.3) states the SCs and STs comprise almost 80 per cent of the total households lie in marginal category of the farmers. Out of 54 households a number of 43 belong to SCs and STs in East-Sikkim, the corresponding figure for South-Sikkim is 29. In this district within this category OBC has a significant presence. Out of 6 households in small farmer's category in East-Sikkim 50 per cent belong to ST category.

4.8 Average holding of land size in both of this marginal and small category of farmers in East-Sikkim is higher in comparison to the district of South-Sikkim. The cultivated land resembles the figure of irrigated land in all cases only one exception, in case of small farmers in East-Sikkim the irrigated cultivated land shows a less figure than the figures of owned land as reflected in the Table-4.4.

4.9 The leased in or leased out phenomenon in both of these two districts are found very low. In Sikkim, the cultivators are owners of very tiny plots of land. Moreover, the poverty induced financial stringent of the families does not permit the farmers indulge in leasing activities at large. The irrigated area in leased in land among marginal farmers is 0.03 hectare per farm in both of these two districts. The small farmers in East district, however, were found to have leased in a quantum of un irrigated land.

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

District	Total land owned			Cultivated land		Orchard		Ghasni (Grass land)	Barren (Permanent Fallow)	Long Fallow land	Others
	Irrigated	Un-irrigated	Total	Field crops							
				Irrigated	Un-irrigated	Irrigated	Un-irrigated				
District: East											
Marginal	39.00	61.00	100.00 (1.19)	39.00	23.71	0.00	6.24	4.37	0.00	2.50	11.23
Small	85.71	42.86	100.00 (0.93)	57.14	14.29	0.00	14.29	0.00	0.00	0.00	14.29
Medium	0.00	0.00	100.00 (0.00)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	42.75	59.54	100.00 (1.16)	40.46	22.96	0.00	6.89	4.02	0.00	2.30	11.48
District: South											
Marginal	35.93	64.07	100.00 (0.97)	35.93	20.37	0.00	4.44	3.70	0.00	11.11	7.41
Small	54.55	45.45	100.00 (2.20)	54.55	18.18	0.00	0.00	0.00	0.00	27.27	0.00
Medium	0.00	0.00	100.00 (0.00)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	38.54	61.46	100.00 (1.05)	38.54	20.06	0.00	3.82	3.18	0.00	13.38	6.37
Overall											
Marginal	36.36	63.64	100.00 (1.07)	36.36	18.18	0.00	9.09	0.00	0.00	9.09	9.09
Small	71.43	42.86	100.00 (1.44)	57.14	14.29	0.00	7.14	0.00	0.00	14.29	7.14
Medium	0.00	0.00	100.00 (0.00)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	45.45	63.64	100.00 (1.10)	36.36	18.18	0.00	9.09	0.00	0.00	9.09	9.09

* *Source: Field survey*

* *Figures in parenthesis denote area in ha / farm.*

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

Category	Total land owned		Leased in (+)		Leased out (-)		Net operated	
	Irri	Un-irri	Irri	Un-irri	Irri	Un-irri	Irri	Un-irri
District: East								
Marginal	0.46	0.72	0.03	0.04	0.06	0.02	0.44	0.31
Small	0.80	0.40	0.00	0.13	0.00	0.00	0.53	0.27
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	0.50	0.69	0.03	0.05	0.05	0.01	0.45	0.31
District: South								
Marginal	0.35	0.62	0.03	0.04	0.04	0.00	0.34	0.23
Small	1.20	1.00	0.00	0.00	0.00	0.00	1.20	0.40
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	0.40	0.64	0.03	0.03	0.04	0.00	0.40	0.24
Overall								
Marginal	0.40	0.67	0.03	0.04	0.05	0.01	0.38	0.27
Small	0.96	0.64	0.00	0.08	0.00	0.00	0.80	0.32
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Large	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	0.45	0.67	0.03	0.04	0.04	0.01	0.42	0.28

** Source: Field survey*

Table 4.6. Average Distance of the Source of Water for Irrigation of Sampled Farmers (In Km.)

Categories	Source				
	Canal	Tube well	Tank	Kuhl	Others *
District: East					
Marginal	0.00	0.00	0.00	0.00	1.27
Small	0.00	0.00	0.00	0.00	1.22
Medium	0.00	0.00	0.00	0.00	0.00
All	0.00	0.00	0.00	0.00	1.27
District: South					
Marginal	0.00	0.00	0.00	0.00	2.53
Small	0.00	0.00	0.00	0.00	2.15
Medium	0.00	0.00	0.00	0.00	0.00
All	0.00	0.00	0.00	0.00	2.51
Overall					
Marginal	0.00	0.00	0.00	0.00	1.91
Small	0.00	0.00	0.00	0.00	1.59
Medium	0.00	0.00	0.00	0.00	0.00
All	0.00	0.00	0.00	0.00	1.89

**Others include streams, water harvester, etc.*

** Source: Field survey*

4.10 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. Sometimes the farmers store water for irrigation purposes in the big drams and in emergency do the irrigation works by stretching small pipes onto the nearby horticulture fields. Approximate distance for carrying water from the sources ranges between 1.22 km to 2.53 km in the sample area.

4.11 During field survey it is found that earlier the respondents had to suffer a lot for availing drinking water from a pretty long distance, of late, the Sikkim government has made elaborate arrangement for drinking water for the Sikkimese people to a shorter distance for their convenience. The villagers in East-Sikkim usually have to move at least 1 km for availing drinking water, in case of South-Sikkim the distance is nearing two and half kilometers. Some of them make R.C.C. water tank in their yard and use water for drinking as well as irrigation purposes.

Table 4.7. Average Distance of Source of Drinking Water (Km)

Category	Source		
	Natural	Tap water	Others
District: East			
Marginal	0.00	1.16	0.00
Small	0.00	.78	0.00
Medium	0.00	0.00	0.00
All	0.00	1.12	0.00
District: South			
Marginal	2.28	0.00	0.00
Small	2.65	0.00	0.00
Medium	0.00	0.00	0.00
All	2.31	0.00	0.00
Overall			
Marginal	2.28	1.16	0.00
Small	2.65	.78	0.00
Medium	0.00	0.00	0.00
All	2.31	1.12	0.00

**Others include streams, water harvester, etc.; * Source: Field survey*

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

(%)

Category	Crops								Gross cropped area (acre)	Cropping intensity with fruits (%)	Cropping intensity without fruits (%)
	Maize	Paddy	wheat	Barley	Potato	Pulses	fruits	Others			
District: East											
Marginal	0.00 (0.00)	7.60(53.36)	0.00 (0.00)	0.00 (0.00)	6.64 (46.64)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	14.24 (100.00)	135.40	135.40
Small	0.00 (0.00)	0.80(27.03)	0.00 (0.00)	0.00 (0.00)	2.16 (72.97)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.96 (100.00)	141.11	141.11
Medium	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (100.00)	0.00	0.00
All	0.00 (0.00)	8.40 (48.83)	0.00 (0.00)	0.00 (0.00)	8.80 (51.17)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	17.20 (100.00)	135.97	135.97
District: South											
Marginal	1.81 (12.74)	6.80 (47.79)	0.00 (0.00)	0.00 (0.00)	5.62 (39.47)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	14.23 (100.00)	143.55	143.55
Small	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.60 (100.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.60 (100.00)	126.67	126.67
Medium	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (100.00)	0.00	0.00
All	1.81 (11.45)	6.80 (42.96)	0.00 (0.00)	0.00 (0.00)	7.22 (45.59)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	15.83 (100.00)	142.43	142.43
Overall											
Marginal	1.81 (6.36)	14.40 (50.58)	0.00 (0.00)	0.00 (0.00)	12.26 (43.06)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	28.47 (100.00)	139.55	139.55
Small	0.00 (0.00)	0.80 (17.54)	0.00 (0.00)	0.00 (0.00)	3.76 (82.46)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	4.56 (100.00)	135.33	135.33
Medium	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (100.00)	0.00	0.00
All	1.81 (5.49)	15.20 (46.02)	0.00 (0.00)	0.00 (0.00)	16.02 (48.50)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	33.03 (100.00)	139.20	139.20

** Source: Field survey*

4.12 Farmers in Sikkim owing to the State's varied agro-climatic condition are accustomed in cultivating horticultural crops. Besides these, floriculture and orchid nurseries are preeminently getting priority over the period. In lower plateau and valley areas the farmers cultivate paddy, maize, negligible amount of wheat and potato. Table-4.8 reflects cropping intensity among marginal farmers in South-Sikkim is 143.55 in comparison to marginal farmers in East-Sikkim, where the corresponding figure is 135.40. The small farmers in this district have better average over the small farmers of district of South. The table shows that besides vegetables, paddy and potato contribute a lot in their sowing calendar though figure of maize is very small.

Table 4.9. Productivity of Various Crops Grown by Sampled Farmers

(Qtls./Ha.)

Category	Crops							
	Maize	**Paddy**	**wheat**	**Barley**	**Potato**	**Pulses**	**Fruits**	**Others**
District: East								
Marginal	0.00	37.98	0.00	0.00	74.80	0.00	0.00	0.00
Small	0.00	35.95	0.00	0.00	75.78	0.00	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	0.00	37.83	0.00	0.00	74.90	0.00	0.00	0.00
District: South								
Marginal	14.23	34.78	0.00	0.00	70.78	0.00	0.00	0.00
Small	0.00	42.50	0.00	0.00	77.88	0.00	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	14.23	35.53	0.00	0.00	71.25	0.00	0.00	0.00
Overall								
Marginal	14.23	36.68	0.00	0.00	72.75	0.00	0.00	0.00
Small	0.00	39.23	0.00	0.00	76.60	0.00	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All	14.23	36.88	0.00	0.00	73.08	0.00	0.00	0.00

** Source: Field survey*

4.13 Productivity of potato among small farmers in both of these two districts is higher than others. In case of paddy the farmers inclusive of all categories in East-Sikkim have some definitely edge over the farmers of South-Sikkim.

4.14 Area under different vegetables among sampled farmers in these two districts gives fairly an interesting picture. In both of these two districts among small farmers area under cauliflower is the highest in comparison to other crops (Table-4.10). In terms of coverage, both cabbage and peas in comparison to other crops possess

higher percentages. Area under beans among small farmers in East-Sikkim and marginal farmers in South-Sikkim draw larger attention.

Table 4.10. Area under Different Vegetables among Sampled Farmers

(Hectare)

Category	Vegetables*						
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans	All
District: East							
Marginal	2.09 (13.78)	2.59 (17.06)	4.06 (26.77)	2.69 (17.73)	1.81 (11.93)	1.93 (12.72)	15.17 (100.00)
Small	0.12 (8.82)	0.20 (14.71)	0.24 (17.65)	0.28 (20.59)	0.24 (17.65)	0.28 (20.59)	1.36 (100.00)
Medium	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (100.00)
All	2.21 (13.37)	2.79 (16.87)	4.30 (26.02)	2.97 (17.97)	2.05 (12.40)	2.21 (13.37)	16.53 (100.00)
District: South							
Marginal	1.78 (15.23)	1.78 (15.23)	1.95 (16.67)	2.13 (18.23)	1.64 (14.03)	2.41 (20.61)	11.69 (100.00)
Small	0.08 (2.44)	0.32 (9.76)	0.96 (29.27)	1.68 (51.22)	0.08 (2.44)	0.16 (4.88)	3.20 (100.00)
Medium	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (100.00)
All	1.86 (12.43)	2.10 (14.03)	2.91 (19.43)	3.81 (25.46)	1.72 (11.49)	2.57 (17.16)	14.97 (100.00)
Overall							
Marginal	3.87 (14.41)	4.37 (16.27)	6.01 (22.37)	4.82 (17.95)	3.45 (12.85)	4.34 (16.15)	26.86 (100.00)
Small	0.20 (4.31)	0.52 (11.21)	1.20 (25.86)	1.96 (42.24)	0.32 (6.90)	0.44 (9.48)	4.64 (100.00)
Medium	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (100.00)
All	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)

** Source: Field survey*

** Figures in parenthesis denote percentages*

4.15 Yield of the above vegetables, considering all categories of farmers in these two districts showed an erratic tendency. Yield of tomato among marginal farmers in both of these two districts shows a higher tendency, small farmers in East-Sikkim has a higher production than the small farmers of South-Sikkim, even in the same district production of tomato within this group is higher than the marginal farmers. In case of peas the situation is more or less similar to the above crops. Production of cabbage among small farmers in East-Sikkim is as twice as the production of the some category of farmers in the district of South-Sikkim. The same fact is true about

capsicum, only in case of beans the marginal farmers in South-Sikkim shows higher production over their compatriot farmers in East-Sikkim area.

Table 4.11. Yield of Different Vegetables Grown by Sampled Farmers

(Qtls./Ha.)

Category	Vegetables						
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans	All
District: East							
Marginal	307.73	118.35	234.28	250.35	487.48	116.85	210.78
Small	358.75	139.38	292.50	213.75	569.70	176.68	251.33
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	311.35	119.93	240.30	246.68	493.80	124.03	214.83
District: South							
Marginal	292.35	134.30	248.80	228.20	508.18	144.95	232.38
Small	131.25	73.13	132.50	125.00	245.00	80.00	118.88
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	286.78	129.85	241.05	221.33	498.25	142.63	224.80
Overall							
Marginal	299.75	126.43	241.80	239.08	498.13	132.33	221.78
Small	282.93	106.25	228.50	178.25	461.45	152.50	198.35
Medium	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	298.85	124.93	240.68	234.00	496.05	133.85	219.83

** Source: Field survey*

4.16 Crop rotation is considered as an important agricultural activity. In Sikkim, more so in vegetable cultivation, crop rotation activity is very popular and the farmers are habituated in rotational farming suitable to their land and agro-climatic conditions.

4.17 Here, Table-4.12(a-1) & (b-1) reflects season-wise vegetables crop cultivation by vegetable grower of each district. Please note that the figures in parenthesis indicating percentages may not add up to 100.00 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. (a) Vegetables Crop Rotation in District East

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)

** Source: Field survey*

** 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. (b) Vegetables Crop Rotation in District South

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)

** Source: Field survey*

** 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 4.13. Credit Structure of all Sampled Farmers (for vegetables only)

(Rs./farm)

Particulars	Category	
	Marginal	Small
i. Source of loan		
Bank	14	0
Any other	-	-
ii. Principal amount	26250	-
iii. Outstanding amount	0	-
Rate of interest (%)	7	-

** Source: Field survey*

4.18 It was very difficult to get information about the credit structure of the sampled farmers for vegetables only. As the farmers borrowed money from different sources and for different purposes also. After a detailed discussion with them we got information about credit of institutional sources and from the Table-4.13 it is found that 14 farmers have taken loan from Banks and amount of credit per farmer is Rs.26, 250 with an annual interest of 7 per cent and that amount appeared to be spent for vegetable cultivation only.

Chapter -V

Costs and Returns of Off-Season Vegetables

5.1 Sikkim is a state with rich biodiversity and wide variations in soil quality. This has been associated with climatic situations helpful for growing various types of vegetables, fruits and flowers. For the present study the researchers are concerned about a few off-season vegetables (viz. Pea, Tomato, Cabbage, Cauliflower, Capsicum and Bean) being grown in the East and South districts of the state. In the present chapter assessment of cost and returns of these vegetables has been taken up.

5.2 Cost A1 was divided into eleven components of which Fertilizer, Insecticides and Pesticides were included. At this juncture it should be stated clearly that the state of Sikkim follows the strict norms of organic agriculture. Hence, use of chemical fertilizers, insecticides and pesticides are strictly barred. It was corroborated in the village level survey in the two districts. Moreover, the farmers in Sikkim do not pay land revenue to the Government. Sticks, if and when required for Bean cultivation, are generally get collected by the family. No value could be imputed on such occasions as there is no market for such sticks.

5.3 It has been discussed earlier (in Chapter II) that duration of crop season for the vegetables under reference comprises of 90-100 days. On an average, the cost components are calculated accordingly i.e. for the cropping season of 90 days.

5.4 In case of Pea cultivation in the districts as well as for the state the Cost A1 accounts for around 25 per cent of the total cost (i.e. Cost C) (Table 5.1 (a) to (c)). In East district Cost A1 accounts for 25.5 per cent (25.3% for marginal and 27.7% for small farmers). Corresponding percentages for Pea cultivation in South district is 22.9 per cent (21.2% for marginal & 44.6% for small growers) and on an aggregate it is 24.2 per cent (23.2% & 35.1% for the marginal and small farmers respectively). It is reasonable that proportion of Cost A1 is higher among the small farmers in comparison their marginal counterpart for it accounts for the cost of hired labour. Small farmers use more hired labour than the marginal ones. The relative costs on other components viz. bullock labour, seed, manure, depreciation on farm machinery and interest on working capital reveal similar share for both groups of farmers. On

an average Cost A1 for the marginal farmers cultivating Peas is to the tune Rs. 142696.48 per hectare in the state. The corresponding figure for the small ones is Rs. 126637.23 while the state average amounts to Rs. 141249.70 per hectare (Table 5.1 (c)). No farmer was found growing Peas on leased-in land and paying the rent. Hence, Cost A1 and Cost A2 are same for Pea cultivation in both East and South districts.

Table 5.1. (a) Cost of Cultivation of Peas among Sampled Farmers of District East

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	19250.00	19791.68	19308.03	14.0	16.7	14.3
b. Bullock Labour	3340.00	4000.00	3410.73	2.4	3.4	2.5
c. Seed / Seedlings	3753.75	3395.83	3715.40	2.7	2.9	2.7
d. Manure	7714.18	5025.00	7426.05	5.6	4.2	5.5
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	450.75	255.48	429.83	0.3	0.2	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	307.18	282.13	304.50	0.2	0.2	0.2
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	34815.85	32750.10	34594.53	25.3	27.7	25.5
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	34815.85	32750.10	34594.53	25.3	27.7	25.5
m. Rental value of owned land	6567.80	6567.80	6567.80	4.8	5.6	4.8
n. Interest on fixed capital (Exluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	41383.65	39317.90	41162.33	30.1	33.2	30.4
o. Imputed value of family labour	96118.33	78958.33	94279.78	69.9	66.8	69.6
Cost C (Cost B+o)	137501.98	118276.23	135442.08	100.0	100.0	100.0

Source: Field Survey

5.5 It has been said earlier that rental value of owned land per acre has been derived at by computing the weighted average of rent received from leased-out land and rent paid for leased-in land for the whole year by the farmers growing vegetables. The weighted average was then was attuned to crop duration of 90 days. Rental value of owned land for a specific crop turned out to be Rs. 6567.80 per hectare. There was not much of a difference between the districts (viz. East & South) as to the rent received or paid for leased-out and leased-in land respectively. Terms of lease varied in

accordance with fertility of a single plot. However, fertility difference for each and every plot under lease contract could not be ascertained. Hence, we had to sought on weighted average of rental contract of such plots to arrive at the rental value for owned land. Cost B accounted for 30.4 per cent of total cost (i.e. Cost C) for the farmers of the East district. Corresponding percentage for South district was 27.3 while the overall percentage for all the farmers taken together in two districts was 28.8. Proportion of Cost B appeared to be higher among small farmers in comparison with the marginal growers.

Table 5.1. (b) Cost of Cultivation of Peas among Sampled Farmers of District South

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	8958.33	40625.00	11261.38	6.1	29.2	7.7
b. Bullock Labour	10088.23	9750.00	10063.63	6.8	7.0	6.8
c. Seed / Seedlings	3820.25	3375.00	3787.88	2.6	2.4	2.6
d. Manure	7762.50	7718.75	7759.33	5.3	5.5	5.3
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	558.15	156.25	528.93	0.4	0.1	0.4
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	205.40	517.20	228.08	0.1	0.4	0.2
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	31392.90	62142.20	33629.23	21.2	44.6	22.9
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	31392.90	62142.20	33629.23	21.2	44.6	22.9
m. Rental value of owned land	6567.80	6567.80	6567.80	4.4	4.7	4.5
n. Interest on fixed capital (Excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	37960.70	68710.00	40197.00	25.7	49.4	27.3
o. Imputed value of family labour	109828.43	70468.75	106965.90	74.3	50.6	72.7
Cost C (Cost B+o)	147789.13	139178.75	147162.93	100.0	100.0	100.0

Source: Field Survey

5.6 The whole cost of cultivation scenario reveals a sharp change as we incorporate the imputed value of family labour in the cost. The imputation was carried out with the ruling wage rate of hired labour for the year under reference. The total cost (i.e. Cost C) added up to an average of Rs. 135442.08 per hectare for all farmers cultivating Peas in the East district of Sikkim. The corresponding figure for South

district was Rs. 147162.93 while combined figure for the districts taken together was Rs. 141249.70. In both the districts total cost (Cost C) of Pea cultivation was higher among the marginal farmers as we included the imputed value of family labour in the total cost. The pattern of cost structure clearly indicates that the marginal farmers use more of family labour for Pea cultivation while small farmer are capable of hiring labour services for cultivation. Imputed value of family labour for all the marginal cultivators in aggregate was to the tune of 72.2 per cent (Table 5.1 (c)). On the contrary the proportion was 59.7 in case of all small farmers. The basic logic seemed trivial that the marginal farmers, being faced with resource crunch, generally are not in a position to employ more hired labour for crop enterprise in comparison with their small counterparts. Hence, they depend on more of family labour.

Table 5.1. (c) Cost of Cultivation of Peas among All the Sampled Farmers

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	14053.23	28125.00	15320.95	9.8	22.2	10.8
b. Bullock Labour	6747.53	6300.00	6707.20	4.7	5.0	4.7
c. Seed / Seedlings	3787.33	3387.50	3751.33	2.7	2.7	2.7
d. Manure	7738.58	6102.50	7591.18	5.4	4.8	5.4
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	505.00	215.78	478.93	0.4	0.2	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	255.80	376.15	266.63	0.2	0.3	0.2
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	33087.43	44506.93	34116.23	23.2	35.1	24.2
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	33087.43	44506.93	34116.23	23.2	35.1	24.2
m. Rental value of owned land	6567.80	6567.80	6567.80	4.6	5.2	4.6
n. Interest on fixed capital (Excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	39655.23	51074.73	40684.03	27.8	40.3	28.8
o. Imputed value of family labour	103041.25	75562.50	100565.70	72.2	59.7	71.2
Cost C (Cost B+o)	142696.48	126637.23	141249.70	100.0	100.0	100.0

Source: Field Survey

Table 5.2. (a) Cost of Cultivation of Tomato among Sampled Farmers of District East

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	35841.35	37500.00	35959.83	17.3	17.8	17.3
b. Bullock Labour	2884.63	3000.00	2892.85	1.4	1.4	1.4
c. Seed / Seedlings	30756.40	27812.50	30546.13	14.8	13.2	14.7
d. Manure	5711.83	5275.00	5680.63	2.8	2.5	2.7
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	477.03	457.03	475.60	0.2	0.2	0.2
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	723.10	705.88	721.88	0.3	0.3	0.3
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	76394.33	74750.40	76276.90	36.9	35.4	36.8
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	76394.33	74750.40	76276.90	36.9	35.4	36.8
m. Rental value of owned land	6567.80	6567.80	6567.80	3.2	3.1	3.2
n. Interest on fixed capital (Excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	82962.13	81318.20	82844.70	40.0	38.5	39.9
o. Imputed value of family labour	124264.83	129687.50	124652.15	60.0	61.5	60.1
Cost C (Cost B+o)	207226.95	211005.70	207496.85	100.0	100.0	100.0

Source: Field Survey

5.7 As regards to Tomato cultivation, we found that cost for seed / seedlings to be one of the major components of Cost A1 along with cost incurred for hired labour (Table 5.2 (a) to (c)). For marginal farers of East district cost for seeds accounted for 14.8 per cent while hired labour was to the tune of 17.3 per cent. However, the cost for hiring labour services by the small farmers was more or less similar (17.8%) to that of the marginal ones; though cost incurred for seeds by the small cultivators was marginally lower (13.2%). For all farmers in the East district Cost A1 accounted for 36.8 per cent of the total cost. Most important component of total cost, as observed, had been imputed value of family labour (60.0% and 61.5% for marginal and small farmers respectively). The small vegetable growers constrained by their poor resource position had to depend on family labour in both East and South districts. In fact, vegetable cultivation in general is a labour intensive enterprise.

Table 5.2. (b) Cost of Cultivation of Tomato among Sampled Farmers of District South

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	27142.85	75000.00	28793.10	13.4	36.5	14.2
b. Bullock Labour	5892.85	6000.00	5896.55	2.9	2.9	2.9
c. Seed / Seedlings	21578.10	23250.00	21635.75	10.6	11.3	10.6
d. Manure	6280.23	5625.00	6257.63	3.1	2.7	3.1
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	576.30	312.50	567.20	0.3	0.2	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	550.00	1038.75	566.88	0.3	0.5	0.3
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	62020.35	111226.25	63717.10	30.5	54.2	31.3
l. Rent paid for leased in land	892.85	0.00	862.08	0.4	0.0	0.4
Cost A_2 (Cost A_1+l)	62913.20	111226.25	64579.18	31.0	54.2	31.8
m. Rental value of owned land	6567.80	6567.80	6567.80	3.1	3.2	3.1
n. Interest on fixed capital (Excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	69246.43	117794.05	70920.48	34.1	57.4	34.9
o. Imputed value of family labour	133958.33	87500.00	132356.33	65.9	42.6	65.1
Cost C (Cost B+o)	203204.75	205294.05	203276.80	100.0	100.0	100.0

Source: Field Survey

And poor farmers had to bank on their own family labour rather than hiring labour services. This has been the general situation of vegetable cultivation in Sikkim. This gets corroborated in the field level on cost components of Tomato cultivation. For all farmers in East district, imputed labour cost for family labour had been 60.1 per cent, while it had been 65.1 in South.

Table 5.2. (c) Cost of Cultivation of Tomato among All the Sampled Farmers

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	31331.03	50000.00	32313.60	15.3	23.9	15.7
b. Bullock Labour	4444.45	4000.00	4421.05	2.2	1.9	2.2
c. Seed / Seedlings	25997.28	26291.68	26012.78	12.7	12.6	12.7
d. Manure	6006.55	5391.68	5974.20	2.9	2.6	2.9
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	528.50	408.85	522.20	0.3	0.2	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	633.35	816.83	643.00	0.3	0.4	0.3
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	68941.15	86909.03	69886.83	33.6	41.6	34.0
l. Rent paid for leased in land	462.98	0.00	438.60	0.2	0.0	0.2
Cost A_2 (Cost A_1+l)	69404.10	86909.03	70325.43	33.8	41.6	34.2
m. Rental value of owned land	6567.80	6567.80	6567.80	3.1	3.1	3.1
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	75850.28	93476.83	76778.00	37.0	44.7	37.4
o. Imputed value of family labour	129291.10	115625.00	128571.83	63.0	55.3	62.6
Cost C (Cost B+o)	205141.38	209101.83	205349.80	100.0	100.0	100.0

Source: Field Survey

5.8 For the South district exclusively, however, expenditure on hired labour charges incurred by the small farmers was substantially higher than their marginal counterpart (Table 5.2 (b)). Observed proportion for small and marginal farmers were 36.5 per cent and 13.4 per cent respectively. Total cost (Cost C) per hectare for Tomato cultivation varied between Rs.203276.80 and Rs. 207496.85 in districts of South and East. As there were only a few farmers cultivating Tomato in leased-in land, hence, rent component were meager one (only 0.4% in case of marginal farmers).

Table 5.3. (a) Cost of Cultivation of Beans among Sampled Farmers of District East

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	23977.28	10416.68	22350.00	16.4	8.7	15.6
b. Bullock Labour	4295.45	4000.00	4260.00	2.9	3.4	3.0
c. Seed / Seedlings	16664.88	19000.00	16945.08	11.4	15.9	11.8
d. Manure	5353.08	3100.00	5082.70	3.7	2.6	3.6
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	450.50	351.83	438.68	0.3	0.3	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	459.95	325.18	443.78	0.3	0.3	0.3
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	51201.13	37193.65	49520.23	35.0	31.2	34.6
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	51201.13	37193.65	49520.23	35.0	31.2	34.6
m. Rental value of owned land	6567.80	6567.80	6567.80	4.5	5.5	4.6
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	57768.93	43761.45	56088.03	39.5	36.7	39.2
o. Imputed value of family labour	88551.13	75625.00	87000.00	60.5	63.3	60.8
Cost C (Cost B+o)	146320.05	119386.45	143088.03	100.0	100.0	100.0

Source: Field Survey

5.9 Aggregate figures on cost of Tomato cultivation validated our earlier findings that family labour turned out to be major component of total cost for both marginal and small farmers with differences within them depending on the relative resource position. Costs for seed / seedling per acre are same for the two classes of farmers.

5.10 Total cost of Bean cultivation for both the groups of farmers of two districts taken together was Rs. 149281.83 per hectare Table 5.3 (a) to (c)). The total cost of cultivation of Beans was around the cost of Pea cultivation and was lower than the cost for Tomato. However, the total cost in South district was significantly higher than that in the East district of Sikkim (in South the total cost was to the tune of Rs. 154811.98 per hectare, while it was Rs. 143088.03 in East).

Table 5.3. (b) Cost of Cultivation of Beans among Sampled Farmers of District South

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	14652.78	56250.00	16138.40	9.4	38.0	10.4
b. Bullock Labour	2777.78	6000.00	2892.85	1.8	4.1	1.9
c. Seed / Seedlings	17408.95	14700.00	17312.20	11.2	9.9	11.2
d. Manure	5431.43	5625.00	5438.33	3.5	3.8	3.5
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	550.20	156.25	536.13	0.4	0.1	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	374.93	765.75	388.90	0.2	0.5	0.3
k. Miscellaneous expenditure (Machinery, water, elect. charges etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	41196.05	83497.00	42706.80	26.6	56.5	27.6
l. Rent paid for leased in land	925.93	0.00	892.85	0.6	0.0	0.6
Cost A_2 (Cost A_1+l)	42121.98	83497.00	43599.65	27.2	56.5	28.2
m. Rental value of owned land	6567.80	6567.80	6567.80	4.1	4.4	4.1
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	48446.53	90064.80	49932.90	31.2	60.9	32.3
o. Imputed value of family labour	106622.30	57812.50	104879.10	68.8	39.1	67.7
Cost C (Cost B+o)	155068.83	147877.30	154811.98	100.0	100.0	100.0

Source: Field Survey

5.11 An interesting feature as regards to Bean cultivation was observed from our field level data. The marginal farmers of East district were observed to have spent more on hiring labour services for Bean cultivation. But in South district, however, the familiar pattern of hiring labour by small farmers in higher quantum had been observed. In South district the difference between the two classes of farmers in this regard was striking (9.4% by the marginal farmers, while small farmers spent 38% of the total cost for employing hired labourers). As in case of Pea and Tomato, imputed value of family was the major component of total cost for Bean cultivation too. For all the farmers imputed value of family labour accounted for around 65 per cent of Cost C.

Table 5.3. (c) Cost of Cultivation of Beans among All the Sampled Farmers

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	18839.28	21875.00	19068.40	12.5	17.3	12.8
b. Bullock Labour	3459.18	4500.00	3537.73	2.3	3.6	2.4
c. Seed / Seedlings	17074.88	17925.00	17139.03	11.3	14.2	11.5
d. Manure	5396.25	3731.25	5270.58	3.6	2.9	3.5
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	505.43	302.93	490.15	0.3	0.2	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	413.10	435.33	414.78	0.3	0.3	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	45688.13	48769.50	45920.68	30.2	38.6	30.8
l. Rent paid for leased in land	510.20	0.00	471.70	0.3	0.0	0.3
Cost A_2 (Cost A_1+l)	46198.33	48769.50	46392.38	30.6	38.6	31.1
m. Rental value of owned land	6567.80	6567.80	6567.80	4.3	5.2	4.3
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	52632.10	55337.30	52836.25	34.8	43.7	35.4
o. Imputed value of family labour	98508.73	71171.88	96445.55	65.2	56.3	64.6
Cost C (Cost B+o)	151140.80	126509.18	149281.83	100.0	100.0	100.0

Source: Field Survey

5.12 Cultivation of Cabbage and Cauliflower revealed no different pattern of cost structure than the vegetables we have discussed so far. In Cauliflower, however, the farmers seemed to have used more manures than the other vegetables under present consideration (Tables 5.4 (a) to (c) and Tables 5.5 (a) to (c)). In case of Cauliflower the cost of manure application was over 6 per cent while for other vegetables it had been between 3-5 per cent of total cost. However, total cost of cultivation of Cauliflower per acre had been less than that for Cabbage.

Table 5.4. (a) Cost of Cultivation of Cabbage among Sampled Farmers of District East

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	22908.65	7291.68	21293.10	15.8	5.5	14.8
b. Bullock Labour	4153.85	0.00	3724.15	2.9	0.0	2.6
c. Seed / Seedlings	11533.33	12025.00	11584.20	8.0	9.1	8.1
d. Manure	6405.80	6366.68	6401.75	4.4	4.8	4.5
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	273.18	427.35	289.13	0.2	0.3	0.2
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	408.48	256.83	392.80	0.3	0.2	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	45683.28	26367.53	43685.10	31.5	19.9	30.4
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	45683.28	26367.53	43685.10	31.5	19.9	30.4
m. Rental value of owned land	6567.80	6567.80	6567.80	4.5	5.0	4.6
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	52251.08	32935.30	50252.90	36.0	24.9	35.0
o. Imputed value of family labour	92754.40	99479.18	93450.08	64.0	75.1	65.0
Cost C (Cost B+o)	145005.48	132414.48	143702.98	100.0	100.0	100.0

Source: Field Survey

5.13 As we are already aware that the state of Sikkim observes strict norms of organic farming, the cost of manuring had been higher in the hills than what we generally observe in the plains. In the plains cultivation of vegetables is generally more dependent on application of fertilizers and pesticides. This has been a unique feature of the Sikkim state to have strongly following an organic agricultural practice. Favourable climatic conditions and rich and generous biodiversity add impetus to such practices resulting in considerably high output per acre.

Table 5.4. (b) Cost of Cultivation of Cabbage among Sampled Farmers of District South

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	5505.95	52500.00	8638.90	3.4	34.2	5.3
b. Bullock Labour	3500.00	6000.00	3666.68	2.1	3.9	2.3
c. Seed / Seedlings	27518.60	26000.00	27417.38	16.9	16.9	16.9
d. Manure	6727.23	6725.00	6727.08	4.1	4.4	4.1
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	599.78	93.75	566.03	0.4	0.1	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	397.53	852.25	427.83	0.2	0.6	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	44249.08	92171.00	47443.88	27.1	60.1	29.2
l. Rent paid for leased in land	892.85	0.00	833.33	0.5	0.0	0.5
Cost A_2 (Cost A_1+l)	45141.93	92171.00	48277.20	27.7	60.1	29.7
m. Rental value of owned land	6567.80	6567.80	6567.80	3.9	4.3	3.9
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	51475.15	98738.80	54626.08	31.6	64.4	33.6
o. Imputed value of family labour	111625.75	54687.50	107829.88	68.4	35.6	66.4
Cost C (Cost B+o)	163100.90	153426.30	162455.93	100.0	100.0	100.0

Source: Field Survey

Table 5.4. (c) Cost of Cultivation of Cabbage among All the Sampled Farmers

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Margina	Small	All
a. Human Labour (Hired)	13885.03	25375.00	14858.75	9.0	18.0	9.7
b. Bullock Labour	3814.83	2400.00	3694.93	2.5	1.7	2.4
c. Seed / Seedlings	19822.00	17615.00	19634.95	12.8	12.5	12.8
d. Manure	6572.48	6510.00	6567.18	4.3	4.6	4.3
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	442.53	293.90	429.93	0.3	0.2	0.3
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	402.80	495.00	410.60	0.3	0.4	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	44939.63	52688.90	45596.33	29.1	37.4	29.8
l. Rent paid for leased in land	462.98	0.00	423.73	0.3	0.0	0.3
Cost A_2 (Cost A_1+l)	45402.58	52688.90	46020.08	29.4	37.4	30.0
m. Rental value of owned land	6567.80	6567.80	6567.80	4.2	4.7	4.2
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	51848.75	59256.70	52476.55	33.6	42.1	34.2
o. Imputed value of family labour	102539.55	81562.50	100761.83	66.4	57.9	65.8
Cost C (Cost B+o)	154388.30	140819.20	153238.38	100.0	100.0	100.0

Source: Field Survey

Table 5.5. (a) Cost of Cultivation of Cauliflower among Sampled Farmers of District East

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	7314.83	12500.00	7672.43	7.3	11.2	7.6
b. Bullock Labour	2555.55	3000.00	2586.20	2.6	2.7	2.6
c. Seed / Seedlings	12730.28	14275.00	12836.83	12.7	12.8	12.7
d. Manure	6692.53	6856.25	6703.80	6.7	6.1	6.6
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	460.35	199.23	442.33	0.5	0.2	0.4
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	267.38	336.33	272.13	0.3	0.3	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	30020.90	37166.78	30513.70	30.0	33.3	30.2
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	30020.90	37166.78	30513.70	30.0	33.3	30.2
m. Rental value of owned land	6567.80	6567.80	6567.80	6.6	5.9	6.5
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	36588.68	43734.58	37081.50	36.5	39.2	36.7
o. Imputed value of family labour	63545.53	67968.75	63850.58	63.5	60.8	63.3
Cost C (Cost B+o)	100134.20	111703.33	100932.08	100.0	100.0	100.0

Source: Field Survey

Table 5.5. (b) Cost of Cultivation of Cauliflower among Sampled Farmers of District South

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	5044.65	35625.00	7083.33	4.5	22.2	6.1
b. Bullock Labour	3250.00	6000.00	3433.33	2.9	3.7	3.0
c. Seed / Seedlings	28283.70	31781.25	28516.88	25.1	19.8	24.6
d. Manure	7025.00	10281.25	7242.08	6.2	6.4	6.3
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	491.00	164.08	469.20	0.4	0.1	0.4
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	403.53	776.88	428.43	0.4	0.5	0.4
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	44497.88	84628.45	47173.25	39.5	52.7	40.7
l. Rent paid for leased in land	892.85	0.00	833.33	0.8	0.0	0.7
Cost A_2 (Cost A_1+l)	45390.73	84628.45	48006.58	40.3	52.7	41.5
m. Rental value of owned land	6567.80	6567.80	6567.80	5.6	4.1	5.5
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	51723.98	91196.25	54355.45	45.9	56.7	46.9
o. Imputed value of family labour	60855.65	69531.25	61434.03	54.1	43.3	53.1
Cost C (Cost B+o)	112579.63	160727.50	115789.48	100.0	100.0	100.0

Source: Field Survey

Table 5.5. (c) Cost of Cultivation of Cauliflower among All the Sampled Farmers

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	6159.10	24062.50	7372.88	5.8	17.7	6.8
b. Bullock Labour	2909.10	4500.00	3016.95	2.7	3.3	2.8
c. Seed / Seedlings	20648.40	23028.13	20809.73	19.4	16.9	19.2
d. Manure	6861.78	8568.75	6977.50	6.4	6.3	6.4
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	475.95	181.65	456.00	0.4	0.1	0.4
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	336.70	556.60	351.60	0.3	0.4	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	37391.00	60897.60	38984.65	35.1	44.7	35.9
l. Rent paid for leased in land	454.55	0.00	423.73	0.4	0.0	0.4
Cost A_2 (Cost A_1+l)	37845.53	60897.60	39408.38	35.5	44.7	36.3
m. Rental value of owned land	6567.80	6567.80	6567.80	6.1	4.8	6.0
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	44293.93	67465.40	45864.88	41.6	49.5	42.3
o. Imputed value of family labour	62176.13	68750.00	62621.83	58.4	50.5	57.7
Cost C (Cost B+o)	106470.05	136215.40	108486.68	100.0	100.0	100.0

Source: Field Survey

5.14 Like Tomato, Capsicum had been the other vegetable which required a very high cost to be cultivated in the hilly tract of Sikkim. Nonetheless, the growing demand for Capsicum throughout the country must have been a source of encouragement to the farmers to indulge in such enterprise. The total cost per hectare in the East district was Rs. 184903.20 and in South it was Rs. 192997.43 averaging around Rs. 188988.85 for all the sampled farmers (Tables 5.6 (a) to (c)). Cost for seed / seedling had been around 15 per cent of the total cost. Contrarily cost of manure per acre accounted for 3-4.9 per cent. Small farmers of both the districts were observed to have employed more hired labour than their marginal counterparts. But over and above all the imputed value of family labour, as in case of other vegetables, had been the most important component of total cost.

Table 5.6. (a) Cost of Cultivation of Capsicum among Sampled Farmers of District East

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	18789.08	37500.00	20228.38	10.1	21.5	10.9
b. Bullock Labour	3000.00	6000.00	3230.78	1.6	3.4	1.7
c. Seed / Seedlings	28464.48	28968.75	28503.28	15.3	16.6	15.4
d. Manure	5614.50	5612.50	5614.35	3.0	3.2	3.0
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	459.58	199.23	439.55	0.2	0.1	0.2
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	528.68	720.83	543.45	0.3	0.4	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	56856.30	79001.28	58559.75	30.6	45.3	31.7
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	56856.30	79001.28	58559.75	30.6	45.3	31.7
m. Rental value of owned land	6567.80	6567.80	6567.80	3.5	3.8	3.6
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	63424.10	85569.08	65127.55	34.1	49.1	35.2
o. Imputed value of family labour	122367.63	88671.88	119775.65	65.9	50.9	64.8
Cost C (Cost B+o)	185791.73	174240.95	184903.20	100.0	100.0	100.0

Source: Field Survey

5.15 We all know that vegetable cultivation is primarily a labour intensive enterprise in this country. It is a fact that vegetables require continuous nurturing and thorough supervision in the process. Moreover, harvesting generally is done in phases throughout crop season. Hence, employment of family labour becomes most important in such enterprise. Hiring of labour services is generally done during tillage and sowing. But for the other activities the marginal and small farmers depend on their family labour.

Table 5.6. (b) Cost of Cultivation of Capsicum among Sampled Farmers of District South

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	14754.90	37500.00	15613.20	7.7	19.1	8.1
b. Bullock Labour	3411.78	6000.00	3509.43	1.8	3.1	1.8
c. Seed / Seedlings	28115.60	30000.00	28186.70	14.6	15.3	14.6
d. Manure	9637.75	5850.00	9494.80	5.0	3.0	4.9
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	482.60	312.50	476.18	0.3	0.2	0.2
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	525.08	733.50	532.95	0.3	0.4	0.3
k. Miscellaneous expenditure (Machinery, water, elect. Charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	56927.68	80396.00	57813.28	29.5	40.9	30.0
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	56927.68	80396.00	57813.28	29.5	40.9	30.0
m. Rental value of owned land	6567.80	6567.80	6567.80	3.4	3.3	3.4
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	63495.48	86963.80	64381.08	32.9	44.3	33.4
o. Imputed value of family labour	129370.93	109375.00	128616.35	67.1	55.7	66.6
Cost C (Cost B+o)	192866.40	196338.80	192997.43	100.0	100.0	100.0

Source: Field Survey

5.16 Input-output analysis revealed the fact that in terms of per acre returns crop enterprise off-season vegetables remained lucrative proposition. But at the same time it has to be kept in mind that the data pertaining to all cost and returns figures relate to an estimate per acre. The small and marginal farmers, though reaping benefits of vegetable cultivation, might not be gaining in fabulous amounts as it looks for the fact that scale of operation is very small.

Table 5.6. (c) Cost of Cultivation of Capsicum among All the Sampled Farmers

Cost Components	Value in (Rs./Ha.)			Percentage		
	Marginal	Small	All	Marginal	Small	All
a. Human Labour (Hired)	16710.85	37500.00	17898.80	8.8	20.6	9.5
b. Bullock Labour	3212.13	6000.00	3371.43	1.7	3.3	1.8
c. Seed / Seedlings	28284.75	29312.50	28343.48	14.9	16.1	15.0
d. Manure	7687.08	5691.68	7573.05	4.1	3.1	4.0
e. Fertilizer	0.00	0.00	0.00	0.0	0.0	0.0
f. Insecticides and pesticides	0.00	0.00	0.00	0.0	0.0	0.0
g. Sticks	0.00	0.00	0.00	0.0	0.0	0.0
h. Depreciation (Implements and farm building)	471.45	236.98	458.05	0.2	0.1	0.2
i. Land Revenue and taxes	0.00	0.00	0.00	0.0	0.0	0.0
j. Interest on working capital	526.83	725.05	538.15	0.3	0.4	0.3
k. Miscellaneous expenditure (Machinery, water, elect. charges, etc.)	0.00	0.00	0.00	0.0	0.0	0.0
Total (Cost A_1)	56893.08	79466.20	58182.98	30.0	43.8	30.8
l. Rent paid for leased in land	0.00	0.00	0.00	0.0	0.0	0.0
Cost A_2 (Cost A_1+l)	56893.08	79466.20	58182.98	30.0	43.8	30.8
m. Rental value of owned land	6567.80	6567.80	6567.80	3.5	3.6	3.5
n. Interest on fixed capital (excluding land)	0.00	0.00	0.00	0.0	0.0	0.0
Cost B (Cost A_2+m+n)	63460.88	86034.00	64750.75	33.5	47.4	34.3
o. Imputed value of family labour	125975.38	95572.93	124238.10	66.5	52.6	65.7
Cost C (Cost B+o)	189436.25	181606.90	188988.85	100.0	100.0	100.0

Source: Field Survey

5.17 Gross returns from Peas cultivation exhibited that per acre gross return was higher among marginal farmers than the small ones in both East and South districts (Table 5.7(a)). On the whole gross return was to the tune of Rs. 360841.20 per hectare for the marginal farmers while the corresponding figure for the small farmers was Rs. 278241.30. And the overall average had been Rs. 353399.70 per hectare. Net return over total cost (Cost C) had also been higher among the marginal farmers in comparison with the small cultivators. It might have been due to participation of family labour in crop enterprise, who care for their own crop, is higher among the marginal category. The 'love and care' of the participating members might have resulted in higher output and hence, higher net return. This reasoning was corroborated in cultivation of Tomato too where the marginal farmers had an edge

over small farmers in terms of gross return and net return over total cost (Table 5.7 (b)).

Table 5.7.(a) Input output- Analysis in Peas Production (Rs./Ha)

Particulars	Marginal	Small	Overall
District - East			
Cost A_1	34815.85	32750.10	34594.53
Cost A_2	34815.85	32750.10	34594.53
Cost B	41383.65	39317.90	41162.33
Cost C	137502.00	118276.20	135442.10
Gross returns	350577.10	285691.70	343625.10
Net returns over			
Cost A_1	315761.20	252941.60	309030.60
Cost A_2	315761.20	252941.60	309030.60
Cost B	309193.40	246373.80	302462.80
Cost C	213075.10	167415.50	208183.00
District - South			
Cost A_1	31392.90	62142.20	33629.23
Cost A_2	31392.90	62142.20	33629.23
Cost B	37960.70	68710.00	40197.00
Cost C	147789.10	139178.80	147162.90
Gross returns	370904.00	267065.60	363352.10
Net returns over			
Cost A_1	339511.10	204923.50	329722.90
Cost A_2	339511.10	204923.50	329722.90
Cost B	332943.30	198355.70	323155.10
Cost C	223114.90	127886.90	216189.20
Overall			
Cost A_1	33087.43	44506.93	34116.23
Cost A_2	33087.43	44506.93	34116.23
Cost B	39655.23	51074.73	40684.03
Cost C	142696.50	126637.20	141249.70
Gross returns	360841.20	278241.30	353399.70
Net returns over			
Cost A_1	327753.80	233734.30	319283.50
Cost A_2	327753.80	233734.30	319283.50
Cost B	321186.00	227166.50	312715.70
Cost C	218144.70	151604.00	212150.00

Source: Field Survey

Table 5.7.(b) Input output- Analysis in Tomato Production (Rs./Ha)

Particulars	Marginal	Small	Overall
District - East			
Cost A_1	74750.40	76276.90	74750.40
Cost A_2	74750.40	76276.90	74750.40
Cost B	81318.20	82844.70	81318.20
Cost C	211005.70	207496.90	211005.70
Gross returns	1010494.00	1009147.00	1010494.00
Net returns over			
Cost A_1	932648.60	935743.40	932869.60
Cost A_2	932648.60	935743.40	932869.60
Cost B	926080.80	929175.60	926301.80
Cost C	801815.90	799488.10	801649.70
District - South			
Cost A_1	111226.30	63717.10	111226.30
Cost A_2	111226.30	64579.18	111226.30
Cost B	117794.10	70920.48	117794.10
Cost C	205294.10	203276.80	205294.10
Gross returns	542062.50	856189.20	542062.50
Net returns over			
Cost A_1	805387.70	430836.30	792472.10
Cost A_2	804494.80	430836.30	791610.00
Cost B	798161.60	424268.50	785268.70
Cost C	664203.30	336768.50	652912.40
Overall			
Cost A_1	68941.15	86909.03	69886.83
Cost A_2	69404.10	86909.03	70325.43
Cost B	75850.28	93476.83	76778.00
Cost C	205141.40	209101.80	205349.80
Gross returns	935602.60	854350.00	931326.10
Net returns over			
Cost A_1	866661.40	767441.00	861439.30
Cost A_2	866198.50	767441.00	861000.70
Cost B	859752.30	760873.20	854548.10
Cost C	730461.20	645248.20	725976.30

Source: Field Survey

5.18 However, for Beans and Cabbage we observed a mixed pattern of gross and net returns between the districts and between classes (Tables 5.7 (c) & (d)). In case of Beans cultivation the small farmers were found to have earned higher net return as compared to the small farmers in the East district. The South, however, reflected a reverse picture. In the overall scenario, the small farmers had an edge over the others. Similar variation was observed as regards to Cabbage cultivation where in East small

farmers reaped higher net return per acre while marginal farmers gained more in South. Overall, small farmers had a comparative advantage.

Table 5.7.(c) Input output- Analysis in Beans Production (Rs./Ha)

Particulars	Marginal	Small	Overall
District - East			
Cost A_1	51201.13	37193.65	49520.23
Cost A_2	51201.13	37193.65	49520.23
Cost B	57768.93	43761.45	56088.03
Cost C	146320.05	119386.45	143088.03
Gross returns	369751.45	481729.18	383188.78
Net returns over			
Cost A_1	318550.33	444535.50	333668.55
Cost A_2	318550.33	444535.50	333668.55
Cost B	311982.55	437967.73	327100.75
Cost C	223431.40	362342.73	240100.75
District - South			
Cost A_1	41196.05	83497.00	42706.80
Cost A_2	42121.98	83497.00	43599.65
Cost B	48446.53	90064.80	49932.90
Cost C	155068.83	147877.30	154811.98
Gross returns	450876.10	318000.00	446130.53
Net returns over			
Cost A_1	409680.05	234503.00	403423.73
Cost A_2	408754.13	234503.00	402530.88
Cost B	402429.58	227935.20	396197.63
Cost C	295807.28	170122.70	291318.55
Overall			
Cost A_1	45688.13	48769.50	45920.68
Cost A_2	46198.33	48769.50	46392.38
Cost B	52632.10	55337.30	52836.25
Cost C	151140.80	126509.18	149281.83
Gross returns	414452.80	440796.88	416441.03
Net returns over			
Cost A_1	368764.68	392027.38	370520.35
Cost A_2	368254.45	392027.38	370048.65
Cost B	361820.70	385459.58	363604.78
Cost C	263311.98	314287.70	267159.20

Source: Field Survey

Table 5.7.(d) Input output- Analysis in Cabbage Production (Rs./Ha)

Particulars	Marginal	Small	Overall
District - East			
Cost A_1	45683.28	26367.53	43685.10
Cost A_2	45683.28	26367.53	43685.10
Cost B	52251.08	32935.30	50252.90
Cost C	145005.48	132414.48	143702.98
Gross returns	506472.88	708966.68	527420.50
Net returns over			
Cost A_1	460789.60	682599.15	483735.40
Cost A_2	460789.60	682599.15	483735.40
Cost B	454221.80	676031.35	477167.60
Cost C	361467.38	576552.20	383717.53
District - South			
Cost A_1	44249.08	92171.00	47443.88
Cost A_2	45141.93	92171.00	48277.20
Cost B	51475.15	98738.80	54626.08
Cost C	163100.90	153426.30	162455.93
Gross returns	517869.80	338831.25	505933.90
Net returns over			
Cost A_1	473620.73	246660.25	458490.03
Cost A_2	472727.88	246660.25	457656.70
Cost B	466394.63	240092.45	451307.83
Cost C	354768.90	185404.95	343477.95
Overall			
Cost A_1	44939.63	52688.90	45596.33
Cost A_2	45402.58	52688.90	46020.08
Cost B	51848.75	59256.70	52476.55
Cost C	154388.30	140819.20	153238.38
Gross returns	512382.38	560912.50	516495.10
Net returns over			
Cost A_1	467442.78	508223.60	470898.78
Cost A_2	466979.80	508223.60	470475.05
Cost B	460533.63	501655.80	464018.55
Cost C	357994.10	420093.30	363256.73

Source: Field Survey

5.19 Contrarily, Cauliflower and Capsicum fitted into our earlier model that the marginal farmers with their family effort have been successful in reaping more benefit from off-season vegetable cultivation. On the overall scenario for both the vegetables the marginal growers were found harvesting more benefit from crop cultivation in terms of net return per acre over total cost (Tables 5.7 (e) & (f)). However, small farmers of East district cultivating cauliflower had a slight edge over

the marginal ones. Otherwise, the general pattern remained in favour of the marginal farmers.

Table 5.7.(e) Input output- Analysis in Cauliflower Production (Rs./Ha)

Particulars	Marginal	Small	Overall
District - East			
Cost A_1	30020.90	37166.78	30513.70
Cost A_2	30020.90	37166.78	30513.70
Cost B	36588.68	43734.58	37081.50
Cost C	100134.20	111703.33	100932.08
Gross returns	704030.23	720762.50	705184.18
Net returns over			
Cost A_1	674009.33	683595.73	674670.48
Cost A_2	674009.33	683595.73	674670.48
Cost B	667441.55	677027.93	668102.68
Cost C	603896.03	609059.18	604252.10
District - South			
Cost A_1	44497.88	84628.45	47173.25
Cost A_2	45390.73	84628.45	48006.58
Cost B	51723.98	91196.25	54355.45
Cost C	112579.63	160727.50	115789.48
Gross returns	622082.15	383125.00	606151.68
Net returns over			
Cost A_1	577584.28	298496.58	558978.43
Cost A_2	576691.43	298496.58	558145.10
Cost B	570358.18	291928.78	551796.23
Cost C	509502.53	222397.53	490362.20
Overall			
Cost A_1	37391.00	60897.60	38984.65
Cost A_2	37845.53	60897.60	39408.38
Cost B	44293.93	67465.40	45864.88
Cost C	106470.05	136215.40	108486.68
Gross returns	662311.20	551943.75	654828.65
Net returns over			
Cost A_1	624920.20	491046.15	615844.00
Cost A_2	624465.68	491046.15	615420.28
Cost B	618017.28	484478.35	608963.80
Cost C	555841.15	415728.35	546341.98

Source: Field Survey

Table 5.7.(f) Input output- Analysis in Capsicum Production (Rs./Ha)

Particulars	Marginal	Small	Overall
District - East			
Cost A_1	56856.30	79001.28	58559.75
Cost A_2	56856.30	79001.28	58559.75
Cost B	63424.10	85569.08	65127.55
Cost C	185791.73	174240.95	184903.20
Gross returns	2314455.45	2160879.70	2302641.93
Net returns over			
Cost A_1	2257599.15	2081878.40	2244082.18
Cost A_2	2257599.15	2081878.40	2244082.18
Cost B	2251031.35	2075310.60	2237514.38
Cost C	2128663.73	1986638.73	2117738.73
District - South			
Cost A_1	56927.68	80396.00	57813.28
Cost A_2	56927.68	80396.00	57813.28
Cost B	63495.48	86963.80	64381.08
Cost C	192866.40	196338.80	192997.43
Gross returns	2288452.53	2027375.00	2278600.55
Net returns over			
Cost A_1	2231524.85	1946979.00	2220787.28
Cost A_2	2231524.85	1946979.00	2220787.28
Cost B	2224957.05	1940411.20	2214219.48
Cost C	2095586.15	1831036.20	2085603.13
Overall			
Cost A_1	56893.08	79466.20	58182.98
Cost A_2	56893.08	79466.20	58182.98
Cost B	63460.88	86034.00	64750.75
Cost C	189436.25	181606.90	188988.85
Gross returns	2301060.00	2116378.13	2290506.75
Net returns over			
Cost A_1	2244166.93	2036911.95	2232323.80
Cost A_2	2244166.93	2036911.95	2232323.80
Cost B	2237599.15	2030344.15	2225756.00
Cost C	2111623.75	1934771.23	2101517.90

Source: Field Survey

5.20 Before going into the next section of input-output ratio, a few words is required to be stated as regards to the cropping behviour of the marginal and small farmers. In Sikkim the average size of holding for vegetable cultivation in the off-season is very small. Being situated in the hilly tract the state has both advantages and disadvantages of crop cultivation. On one hand the climate and biodiversity remained favourable but on the other the undulation of soil morphology and altitudinal variation poses hindrance for large scale vegetable cultivation. In face of

such situation the growers generally indulge in such cropping practices in tiny plots of lands and try to reap maximum benefit from that small piece of land. Hence, in cases there might have been over optimal use of resources – mainly family labour – in course of the crop enterprise. So, in cases the production process crosses the efficiency frontier.

5.21 Input-output ratio is an average measure of the efficiency of production. It is expressed as the ratio of gross output to total inputs or total costs used in the production process, i.e. output per unit of input. It can be used as a measure of total efficiency of a production process and is subjected by the conditions of optimization. But in a crop economy dominated by marginal and small farmers the question remains whether the growers try to optimize their return. Or instead they look forward to reap maximum return from their cropping activity. Given the abject poverty they are submerged in, they might look forward to maximize the output by employing the cheapest resource in a higher quantum available to them. And the cheapest resource that is available to them is their own family labour which otherwise would have remained unemployed.

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

Category	Vegetables						
	Tomato	Peas	Cabbage	Cauliflower	Capsicum	Beans	All
District East							
Marginal	1.26	1.65	1.40	1.17	1.09	1.65	1.21
Small	1.26	1.71	1.23	1.18	1.09	1.33	1.19
Total	1.26	1.65	1.37	1.17	1.09	1.60	1.21
District South							
Marginal	1.31	1.66	1.46	1.22	1.09	1.52	1.24
Small	1.61	2.09	1.83	1.72	1.11	1.87	1.35
Total	1.31	1.68	1.47	1.24	1.09	1.53	1.24
Overall							
Marginal	1.28	1.65	1.43	1.19	1.09	1.57	1.22
Small	1.32	1.84	1.34	1.33	1.09	1.40	1.24
Total	1.28	1.67	1.42	1.20	1.09	1.56	1.22

Source: Field Survey

5.22 Looking into the variations in the input-output ratios we are faced with the efficiency question as regards to cultivation of off-season vegetables. In terms of input-output ratio the marginal farmers of East revealed a little efficiency in

cultivation of Cabbage and Beans (Table 5.8) as compared to the small farmers. For other crops barring Peas both the classes of farmers exhibited similar efficiency. In case of Peas, the input-output ratio had been favourable towards the small farmers. Contrarily, in the South district the small farmer exhibited a clear edge over their marginal counterpart for all vegetables under consideration. However, in overall scenario the marginal growers seemed to be little more efficient in cultivating relatively low valued crops like Cabbage and Beans.

Chapter-VI

Marketing of Off-Season Vegetables

6.1 The noteworthy feature of East as well as South-Sikkim district and as per the impression available from field level sources, that agricultural marketing in both of these two districts is not at all a problem as conceived by the growers. Government marketing division especially at the cluster level do pretty good jobs thus disposing agricultural produce of the cultivators. A motor van (pick-up) of the Sikkim State Marketing Department with a radius of 10-15km collected harvested commodities in the early morning from an earlier located centre in the villages[1].

6.2 The villagers harvest their products and sell them to the nodal marketing personnel in the village point. The person being a quasi-government employee further sell those commodities in nearby wholesale and retail market and pay price to the farmers in the following day. Sometimes, one or two villagers voluntarily act as liaison to this process. Owing to this mechanism the farmers are quite happy and satisfied, though sometimes resentment does appear when there is glut and the farm price became less and not optimum.

6.3 It is seen from the table-6.1(a) to 6.1(f) that marketing has a prominent role to play irrespective of categories of the farmers in both of them two districts. Among tomato growers inclusive of all categories of farmers it is seen that on an average more than

[1] An FPO (Farmers-Producers-Organization) has been formed to facilitate this process. The task of the FPO is to collect vendible commodities from the farmer and pay the price. The operation of the FPO is very simple. FPO's are some sort of federative structure with a quasi-government status to collect vendible commodities from the farmers. For this purpose one motor van (pick-up van) for each FPO was being provided by the Sikkim government to collect farmers' product from the assemble point (mutually convenient place of the village cluster) and then to dispose it in the nearby Sub-Divisional and District Market. Moreover, the government of Sikkim has constructed a wide marketing kiosk at the central place of Gangtok town for the Farmers'-Producers'-Organizations. There are 25-30 FPO's alias Self Help Groups are functioning in the marketing kiosk. Separate places are allotted for each of them and the members themselves do operational works. Besides disposing a bulk of their product in the marketing centre (at the vicinity of the village) sometimes, they carry their product in the marketing kiosk for retail marketing expecting a higher price.

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

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
District: East						
Marginal	9.70	2.99	0.00	0.00	0.00	97.11
Small	8.90	1.80	0.00	0.00	0.00	68.99
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	9.62	2.81	0.00	0.00	0.00	94.39
District: South						
Marginal	8.07	3.72	0.00	0.00	0.00	96.16
Small	5.25	2.67	0.00	0.00	0.00	97.33
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	7.97	3.76	0.00	0.00	0.00	96.24
Overall						
marginal	8.86	3.39	0.00	0.00	0.00	96.61
Small	7.99	2.00	0.00	0.00	0.00	73.59
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	8.80	3.30	0.00	0.00	0.00	95.23

Source: Field Survey

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

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
District: East						
Marginal	5.03	2.98	0.00	0.40	0.00	96.62
Small	3.73	2.68	0.00	0.27	0.00	97.05
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	4.89	2.86	0.00	0.41	0.00	96.73
District: South						
Marginal	3.69	4.34	0.00	0.27	0.00	95.39
Small	5.85	1.37	0.00	0.34	0.00	98.29
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	3.85	3.90	0.00	0.26	0.00	95.58
Overall						
Marginal	4.35	3.45	0.00	0.46	0.00	96.09
Small	4.58	1.97	0.00	0.22	0.00	97.60
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	4.37	3.43	0.00	0.46	0.00	96.34

Source: Field Survey

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

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
District: East						
Marginal	15.15	1.12	0.00	0.00	0.00	98.88
Small	6.78	1.76	0.00	0.00	0.00	97.35
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	14.56	1.21	0.00	0.00	0.00	98.76
District: South						
Marginal	7.02	2.71	0.00	0.00	0.00	97.44
Small	29.40	0.51	0.00	0.00	0.00	99.49
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	8.51	2.12	0.00	0.00	0.00	97.88
Overall						
Marginal	10.94	1.65	0.00	0.00	0.00	98.35
Small	18.09	0.72	0.00	0.00	0.00	99.06
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	11.43	1.57	0.00	0.00	0.00	98.43

Source: Field Survey

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

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
District: East						
Marginal	9.72	1.85	0.00	0.00	0.00	98.15
Small	11.42	1.23	0.00	0.00	0.00	98.69
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	9.89	1.82	0.00	0.00	0.00	98.18
District: South						
Marginal	7.68	2.47	0.00	0.00	0.00	97.40
Small	49.65	0.28	0.00	0.00	0.00	99.72
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	10.47	1.81	0.00	0.00	0.00	98.19
Overall						
Marginal	8.68	2.19	0.00	0.00	0.00	97.81
Small	26.71	0.52	0.00	0.00	0.00	99.48
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	10.18	1.77	0.00	0.00	0.00	98.23

Source: Field Survey

Table 6.1.(e) Utilization Pattern of Capsicum among Sampled Farmers

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
District: East						
Marginal	16.81	0.71	0.00	0.00	0.00	99.29
Small	22.90	0.22	0.00	0.00	0.00	99.78
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	17.49	0.69	0.00	0.00	0.00	99.31
District: South						
Marginal	16.19	0.80	0.00	0.00	0.00	99.20
Small	9.80	0.51	0.00	0.00	0.00	99.49
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	15.95	0.82	0.00	0.00	0.00	99.18
Overall						
Marginal	16.49	0.79	0.00	0.00	0.00	99.21
Small	19.63	0.25	0.00	0.00	0.00	99.75
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	16.72	0.72	0.00	0.00	0.00	99.28

Source: Field Survey

Table 6.1.(f) Utilization Pattern of Beans among Sampled Farmers

(Percentages)

Category	Total production (Qtls./farm)	Home consumption	Given as wages in kind	Retained for seed	Losses	Marketed
District: East						
Marginal	4.17	6.00	0.00	0.24	0.00	93.53
Small	6.65	3.84	0.00	0.23	0.00	96.09
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	4.38	5.71	0.00	0.24	0.00	99.76
District: South						
Marginal	4.69	5.76	0.00	0.43	0.00	93.82
Small	6.40	1.56	0.00	0.31	0.00	98.13
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	4.75	5.47	0.00	0.42	0.00	94.11
Overall						
Marginal	4.45	5.84	0.00	0.22	0.00	93.93
Small	6.57	3.04	0.00	0.41	0.00	96.65
Medium	0.00	0.00	0.00	0.00	0.00	0.00
All	4.58	5.57	0.00	0.22	0.00	96.66

Source: Field Survey

Table 6.2. (a) Losses in Vegetables up to Market on Sampled Farms

(Qtls./farm)

Particulars	Farm size			
	Marginal	Small	Medium	All
Tomato				
-Due to natural calamities	.0000	.0000	-	.0000
-.At the time of picking/assembling	.1360	.1250	-	.1354
-Grading and packing	.0311	.0267	-	.0308
-.Field to road head	.0587	.0517	-	.0583
-.Road head to market	.1059	.1000	-	.1056
-Total losses	.3317	.3033	-	.3302
Peas				
-Due to natural calamities	.0000	.0000	-	.0000
-.At the time of picking/assembling	.0262	.0363	-	.0270
-Grading and packing	.0095	.0113	-	.0096
-.Field to road head	.0168	.0200	-	.0171
-.Road head to market	.0350	.0450	-	.0358
-Total losses	.0876	.1125	-	.0894
Cabbage				
-Due to natural calamities	.0000	.0000	-	.0000
-.At the time of picking/assembling	.0863	.1820	-	.0944
-Grading and packing	.0386	.0620	-	.0406
-.Field to road head	.0432	.0840	-	.0467
-.Road head to market	.0674	.1160	-	.0715
-Total losses	.2356	.4440	-	.2532
Cauliflower				
-Due to natural calamities	.0000	.0000	-	.0000
-.At the time of picking/assembling	.0556	.3390	-	.0793
-Grading and packing	.0383	.0830	-	.0420
-.Field to road head	.0272	.0560	-	.0296
-.Road head to market	.0801	.2420	-	.0936
-Total losses	.2012	.7200	-	.2444
Capsicum				
-Due to natural calamities	.0000	.0000	-	.0000
-.At the time of picking/assembling	.1032	.0971	-	.1028
-Grading and packing	.0476	.0514	-	.0478
-.Field to road head	.0463	.0329	-	.0454
-.Road head to market	.3063	.2957	-	.3056
-Total losses	.5034	.4771	-	.5016
Beans				
-Due to natural calamities	.0000	.0000	-	.0000
-.At the time of picking/assembling	.0203	.0300	-	.0210
-Grading and packing	.0105	.0425	-	.0129
-.Field to road head	.0201	.0300	-	.0208
-.Road head to market	.0123	.0425	-	.0146
-Total losses	.0633	.1450	-	.0694

Source: Field Survey

Table 6.2. (b) Losses in Vegetables up to Market on Sampled Farms

(Percent to total production)

Particulars	Farm size			
	Marginal	Small	Medium	All
Tomato				
-Total production (qtls.)	956.40	48.30	-	1004.70
-Due to natural calamities	0.00	0.00	-	0.00
-.At the time of picking/assembling	1.54	1.55	-	1.54
-Grading and packing	0.35	0.33	-	0.35
-.Field to road head	0.66	0.64	-	0.66
-.Road head to market	1.20	1.24	-	1.20
-Total losses	3.75	3.77	-	3.75
Peas				
Total production (qtls.)	439.57	45.80	-	485.37
-Due to natural calamities	0.00	0.00	-	0.00
-.At the time of picking/assembling	0.60	0.63	-	0.61
-Grading and packing	0.22	0.20	-	0.22
-.Field to road head	0.39	0.35	-	0.38
-.Road head to market	0.81	0.79	-	0.80
-Total losses	2.01	1.97	-	2.01
Cabbage				
Total production (qtls.)	1181.30	176.70	-	1358.00
-Due to natural calamities	0.00	0.00	-	0.00
-.At the time of picking/assembling	0.79	1.03	-	0.82
-Grading and packing	0.35	0.35	-	0.35
-.Field to road head	0.40	0.48	-	0.41
-.Road head to market	0.62	0.66	-	0.62
-Total losses	2.15	2.51	-	2.20
Cauliflower				
Total production (qtls.)	954.50	261.50	-	1216.00
-Due to natural calamities	0.00	0.00	-	0.00
-.At the time of picking/assembling	0.64	1.30	-	0.78
-Grading and packing	0.44	0.32	-	0.41
-.Field to road head	0.31	0.21	-	0.29
-.Road head to market	0.92	0.93	-	0.92
-Total losses	2.32	2.75	-	2.41
Capsicum				
Total production (qtls.)	1635.70	111.60	-	1747.30
-Due to natural calamities	0.00	0.00	-	0.00
-.At the time of picking/assembling	0.62	0.61	-	0.62
-Grading and packing	0.28	0.32	-	0.29
-.Field to road head	0.28	0.21	-	0.27
-.Road head to market	1.84	1.85	-	1.84
-Total losses	3.02	2.99	-	3.01
Beans				
Total production (qtls.)	436.57	51.80	-	488.37
-Due to natural calamities	0.00	0.00	-	0.00
-.At the time of picking/assembling	0.46	0.46	-	0.46
-Grading and packing	0.24	0.66	-	0.28
-.Field to road head	0.45	0.46	-	0.45
-.Road head to market	0.28	0.66	-	0.32
-Total losses	1.42	2.24	-	1.51

Source: Field Survey

96 per cent of harvest are marketed and rest are used for home consumption. As certified seeds are collected from the horticultural sources, question of retaining output for seed purpose does not arise for tomato cultivation. As far as quantum of output is concerned, crop peas along with cabbage, cauliflower, capsicum and beans show the same result (Table 6.1-a to Table 6.1-f). Only in case of peas and beans a certain percentage of home production are retained as seed.

6.4 It has been observed during the survey for the study that losses in production of vegetables occur at different stages of production, like at the time of picking/harvesting, while grading and assembling of vegetables, and in course of transshipment and transportation of vegetable up to the market. These losses at various stages of production have been depicted here in table 6.2(a) & (b). The major observations from these tables may be presented as follows-

a) Among all six vegetable crops selected for the study, tomato records the highest total loss as proportion to total production, followed by losses in capsicum.

b) In case of tomato, the overall loss stands at .33 quintals per farm or 3.75 per cent of total production, which is particularly high while picking and assembling of output (1.54 per cent of production). The second major source of loss comes out to happen during transportation of tomato from road to market (1.20 per cent of production).

c) In case of capsicum, however, the major source of loss appears to happen during transport of output from road-head to market (1.84 per cent). The overall loss stands at 3.01 per cent of production irrespective of size class of farms.

d) Total losses for cabbage and cauliflower come out to be 2.20 per cent and 2.41 per cent of production respectively. In both cases, the maximum loss has occurred during picking and assembling of the crops.

e) In case of peas and French beans, losses are low as compared to other vegetable crops selected for the study. While total loss as percentage of production for peas stands at 2.01 percent, which for French beans stands at 1.51 percent only.

f) Though occasional hail storms and extreme foggy weather often cause crop loss, but losses due to such natural calamities have not been reported during the reference period for the present study.

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

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market 1	Marketed in market 2
District: East					
Marginal	9.42	0.00	9.42	0.00	0.00
Small	8.67	0.00	8.67	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	9.34	0.00	9.34	0.00	0.00
District: South					
Marginal	7.77	0.00	7.77	0.00	0.00
Small	5.11	0.00	5.11	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	7.67	0.00	7.67	0.00	0.00
Overall					
Marginal	8.56	0.00	8.56	0.00	0.00
Small	7.78	0.00	7.78	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	8.51	0.00	8.51	0.00	0.00

Source: Field Survey

6.5 For all the vegetables concerned, it comes out that the vegetables are entirely marketed in the local markets only (Table 6.3-a to Table 6.3-f). This is particularly because of the fact that most farmers sell their output to FPO (Farmer Producers' Organization) to ensure efficient marketing mechanism, whereas the FPOs sell their output in the local markets.

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

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market 1	Marketed in market 2
District: East					
Marginal	9.09	0.00	9.09	0.00	0.00
Small	5.44	0.00	5.44	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	8.82	0.00	8.82	0.00	0.00
District: South					
Marginal	3.52	0.00	3.52	0.00	0.00
Small	5.75	0.00	5.75	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	3.68	0.00	3.68	0.00	0.00
Overall					
Marginal	6.28	0.00	6.28	0.00	0.00
Small	5.59	0.00	5.59	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	6.22	0.00	6.22	0.00	0.00

Source: Field Survey

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

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market 1	Marketed in market 2
District: East					
Marginal	15.00	0.00	15.00	0.00	0.00
Small	6.60	0.00	6.60	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	14.40	0.00	14.40	0.00	0.00
District: South					
Marginal	6.85	0.00	6.85	0.00	0.00
Small	29.25	0.00	29.25	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	8.35	0.00	8.35	0.00	0.00
Overall					
Marginal	10.78	0.00	10.78	0.00	0.00
Small	17.92	0.00	17.92	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	11.27	0.00	11.27	0.00	0.00

Source: Field Survey

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

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market 1	Marketed in market 2
District: East					
Marginal	9.54	0.00	9.54	0.00	0.00
Small	14.09	0.00	14.09	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	9.85	0.00	9.85	0.00	0.00
District: South					
Marginal	7.48	0.00	7.48	0.00	0.00
Small	49.51	0.00	49.51	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	10.28	0.00	10.28	0.00	0.00
Overall					
Marginal	8.49	0.00	8.49	0.00	0.00
Small	31.80	0.00	31.80	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	10.07	0.00	10.07	0.00	0.00

Source: Field Survey

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

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market 1	Marketed in market 2
District: East					
Marginal	16.69	0.00	16.69	0.00	0.00
Small	34.28	0.00	34.28	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	18.04	0.00	18.04	0.00	0.00
District: South					
Marginal	16.06	0.00	16.06	0.00	0.00
Small	9.75	0.00	9.75	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	15.82	0.00	15.82	0.00	0.00
Overall					
Marginal	16.36	0.00	16.36	0.00	0.00
Small	26.10	0.00	26.10	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	16.92	0.00	16.92	0.00	0.00

Source: Field Survey

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

(Qtls./farm)

Category	Total marketed	Marketed in the village	Marketed in local market	Marketed in market 1	Marketed in market 2
District: East					
Marginal	3.90	0.00	3.90	0.00	0.00
Small	6.39	0.00	6.39	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	4.11	0.00	4.11	0.00	0.00
District: South					
Marginal	4.40	0.00	4.40	0.00	0.00
Small	6.28	0.00	6.28	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	4.47	0.00	4.47	0.00	0.00
Overall					
Marginal	4.18	0.00	4.18	0.00	0.00
Small	6.35	0.00	6.35	0.00	0.00
Medium	0.00	0.00	0.00	0.00	0.00
All	4.30	0.00	4.30	0.00	0.00

Source: Field Survey

6.6 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. As such, the vegetable growers are themselves the retailers and there is little scope for middlemen to intermediate their transactions with wholesalers, which is clearly reflected here in table 6.4 (a) and (b). 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 (a) Producers' s Share and Marketing Margin in Marketing of Vegetables

(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

Source: Field Survey

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

6.7 However, on the part of the expenses incurred by the vegetable growers to bring their products up to the market, 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.

Table 6.4 (b) Producers' s Share and Marketing Margin in Marketing of Vegetables

(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.
9.Consumers' price	100.00	100.00	100.00	100.00	100.00	100.00

Source: Field Survey

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

Chapter - VII

Off-Season Vegetables in Polyhouses

Costs and Returns of Off-Season Vegetables in Poly houses

7.1 In Sikkim, the state in which this study has been carried out, it was observed that all the polyhouse structures have been constructed with 100 per cent subsidy basis by the government. Therefore, data pertaining to the cost of construction of polyhouses are not available.

Table 7.1.1.(a) Cost of Construction of Polyhouse (100m^2)

(Rs./Polyhouse)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land leveling	n.a.	n.a.	n.a.	n.a.
Lay out	n.a.	n.a.	n.a.	n.a.
Erection of structure	n.a.	n.a.	n.a.	n.a.
Covering by polythene	n.a.	n.a.	n.a.	n.a.
Provision of sun shades	n.a.	n.a.	n.a.	n.a.
Erection of Trellis	n.a.	n.a.	n.a.	n.a.
Provision of shelves	n.a.	n.a.	n.a.	n.a.
Heaters	n.a.	n.a.	n.a.	n.a.
Coolers	n.a.	n.a.	n.a.	n.a.
Humidifiers	n.a.	n.a.	n.a.	n.a.
Drip irrigation system	n.a.	n.a.	n.a.	n.a.
Drip irrigation	n.a.	n.a.	n.a.	n.a.
Fogger	n.a.	n.a.	n.a.	n.a.
Other	n.a.	n.a.	n.a.	n.a.
Total cost	n.a.	n.a.	n.a.	n.a.
Amount of subsidy	n.a.	n.a.	n.a.	n.a.
Net cost paid by farmer	n.a.	n.a.	n.a.	n.a.

N.A.: Construction of polyhouse is entirely subsidized by Govt. of Sikkim.

7.2 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.

Table 7.1.1.(b) Cost of Construction of Polyhouse (200m^2)

(Rs./Polyhouse)

Particulars	Imputed value of family labour	Value of hired labour	Material cost	Total Cost
Land leveling	n.a.	n.a.	n.a.	n.a.
Lay out	n.a.	n.a.	n.a.	n.a.
Erection of structure	n.a.	n.a.	n.a.	n.a.
Covering by polythene	n.a.	n.a.	n.a.	n.a.
Provision of sun shades	n.a.	n.a.	n.a.	n.a.
Erection of Trellis	n.a.	n.a.	n.a.	n.a.
Provision of shelves	n.a.	n.a.	n.a.	n.a.
Heaters	n.a.	n.a.	n.a.	n.a.
Coolers	n.a.	n.a.	n.a.	n.a.
Humidifiers	n.a.	n.a.	n.a.	n.a.
Drip irrigation system	n.a.	n.a.	n.a.	n.a.
Drip irrigation	n.a.	n.a.	n.a.	n.a.
Fogger	n.a.	n.a.	n.a.	n.a.
Other	n.a.	n.a.	n.a.	n.a.
Total cost	n.a.	n.a.	n.a.	n.a.
Amount of subsidy	n.a.	n.a.	n.a.	n.a.
Net cost paid by farmer	n.a.	n.a.	n.a.	n.a.

N.A.: Construction of polyhouse is entirely subsidized by Govt. of Sikkim.

7.3 In case of costs of cultivation of capsicum (and tomato) in polyhouse, it can be observed that harvesting of capsicum (and tomato) involves greater costs as compared to other production costs, followed by costs involving intercultural practices and costs on account of seedling/sapling.

7.4 It should be noted here that as compared to other parts of India, costs on account of fertilizers and pesticides 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.

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

(Rs. / polyhouse)

Cost items	Category				
	Small	Medium	Large	Over all	
				Rs.	%
Formation of beds	160.00	-	-	160.00	6.4
Seed / seedlings	394.00	-	-	394.00	15.9
Transplanting	128.00	-	-	128.00	5.2
Manuring / FYM	173.90	-	-	173.90	7.0
Vermicompost	0.00	-	-	0.00	0.0
Fertilizer	0.00	-	-	0.00	0.0
Insecticides / pesticides	0.00	-	-	0.00	0.0
Inter culture	512.00	-	-	512.00	20.6
Irrigation	76.40	-	-	76.40	3.1
Spraying	0.00	-	-	0.00	0.0
Stalking etc.	128.00	-	-	128.00	5.2
Harvesting / picking	784.00	-	-	784.00	31.6
Soil sterilization	128.00	-	-	128.00	5.2
Total	2484.30	-	-	2484.30	100.0

Source: Field Survey
Costs include both hired labour charges and imputed value of family labour.

7.5 Further, it should also be noted here that as the vegetable growers are mostly small in size of operation (100m^2 and 200m^2 of polyhouse cover), the use of hired labour is extremely low. The family members of the vegetable growers themselves do most of the farming activities, which in turn keeps costs of production very low. This is clearly reflected in our study as costs of cultivation for both capsicum and tomato under polyhouse cover stands less than Rs.2500/- per polyhouse.

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

(Rs. / polyhouse)

Cost items	Category				
	Small	Medium	Large	Over all	
				Rs.	%
Formation of beds	256.00	-	-	256.00	11.1
Seed / seedlings	283.76	-	-	283.76	12.3
Transplanting	128.00	-	-	128.00	5.5
Manuring / FYM	142.31	-	-	142.31	6.1
Vermicompost	0.00	-	-	0.00	0.0
Fertilizer	0.00	-	-	0.00	0.0
Insecticides / pesticides	0.00	-	-	0.00	0.0
Inter culture	312.00	-	-	312.00	13.5
Irrigation	6.00	-	-	6.00	0.3
Spraying	0.00	-	-	0.00	0.0
Stalking etc.	128.00	-	-	128.00	5.5
Harvesting / picking	932.00	-	-	932.00	40.2
Soil sterilization	128.00	-	-	128.00	5.5
Total	2316.07	-	-	2316.07	100.0

Source: Field Survey
Costs include both hired labour charges and imputed value of family labour.

7.6 On the whole, it seems that organic farming techniques for these vegetable growers may have resulted into lower yield, but the cost advantages of organic cultivation and extensive used of family labour has ultimately led to higher profits (farm business income) earned by the vegetable growers of Sikkim.

7.7 An analysis of net returns from cultivation of capsicum and tomato has been presented here in table 7.1.3(a) & (b). It is very clear that in case of capsicum, net return stands quite high at Rs.23,619/- on the whole. If we compare the table 7.1.3(a) & (b), it can be observed that though costs of production and marketing is higher for capsicum, a higher net return compensates the costs for capsicum cultivation as compared to cultivation of tomato.

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

(Rs. / polyhouse)

Cost items	Category			
	Small	Medium	Large	Over all
Production cost	2484.30	-	-	2484.30
Marketing cost	2215.80	-	-	2215.80
Total cost	4700.10	-	-	4700.10
Gross Returns	28319.14	-	-	28319.14
Net returns	23619.04	-	-	23619.04

Source: Field Survey, value of total quantity marketed excluding loss*

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

(Rs. / polyhouse)

Cost items	Category			
	Small	Medium	Large	Over all
Production cost	2316.07	-	-	2316.07
Marketing cost	1649.88	-	-	1649.88
Total cost	3965.95	-	-	3965.95
Gross Returns	21124.09	-	-	21124.09
Net returns	17158.14	-	-	17158.14

*Source: Field Survey, * value of total quantity marketed excluding loss*

7.8 However, as has been stated earlier, the FPOs mostly take the responsibility of marketing vegetable output grown by the farmers, who are often the members of the FPOs. The products are sold entirely in the nearby towns and (or) nearby road-side kiosks set up by the government of Sikkim. As such, there is no need for the vegetable growers to pack their output in boxes; rather they use simple things like jute bags and tukris to take their product to the market by themselves through FPOs, which in turn saves both money and time on the part of the farmers. This is why statistics on boxes is not available, at least in case of petty vegetables growers of Sikkim.

Table 7.1.4.(a) Net Returns per Box and Input-output Ratio from Cultivation of Capsicum in Polyhouse

(Rs. / box of 20 Kgs)

Cost items	Category			
	Small	Medium	Large	Over all
Total production (boxes)	NA*	-	-	NA
Cost per box	NA	-	-	NA
Value per box	NA	-	-	NA
Returns per box	NA	-	-	NA
Input output ratio	NA	-	-	NA

NA: Not Applicable

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

Table 7.1.4.(b) Net Returns per Box and Input-output Ratio from Cultivation of Tomato in Polyhouse

(Rs. / box of 20 Kgs)

Cost items	Category			
	Small	Medium	Large	Over all
Total production (boxes)	NA*	-	-	NA
Cost per box	NA	-	-	NA
Value per box	NA	-	-	NA
Returns per box	NA	-	-	NA
Input output ratio	NA	-	-	NA

NA: Not Applicable

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

Marketing System of Polyhouse Vegetable Crops

7.9 In terms of utilization of vegetable crops (capsicum and tomato) grown under polyhouse cover, it has been observed that the farmers retain some part of their vegetable output for self-consumption. In case of capsicum, while about 1.5 per cent of production is retained for consumption that for tomato is comparatively higher at 4.6 per cent of production.

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

Category	Production (Boxes/polyhouse)	(% of total production)			
		Losses	Retained for		
			Family	Gifts	Wages
Capsicum (20kg/Box)					
Small	9.76	2.7	1.5	0.0	0.0
Medium	-	-	-	-	-
Large	-	-	-	-	-
Overall	9.76	2.7	1.5	0.0	0.0
Tomato (25kg/Box)					
Small	5.13	2.9	4.6	0.0	0.0
Medium	-	-	-	-	-
Large	-	-	-	-	-
Overall	5.13	2.9	4.6	0.0	0.0

Source: Field Survey

7.10 In polyhouse cultivation also, the vegetable growers have to face loss of output at various stages of production, like picking, transshipment, transport, etc. Taking all farmers together, the total loss stands at 2.7 per cent and 2.9 per cent of production in case of capsicum and tomato respectively.

7.11 As has been stated a couple of time earlier, the marketing of vegetable output is done mostly through the FPOs, where the farmers are often found to be member participants of such FPOs. As such, most of output is sold to not to far-off or local market, but to the consumers directly through FPOs (shown as 'others' in table 7.2.2). In particular, 71.1 per cent of capsicum production and 62.2 percent of tomato production is sold this way to the consumers through FPOs.

7.12 However, these small vegetables growers of Sikkim are not found to have marketed their output to far-off markets, primarily due to limited quantity of vegetable produced. However, apart from selling directly to the consumers through FPOs, a good proportion of output is sold in the local markets in nearby towns or in roadside organic vegetable kiosks. In particular, while about 28.9 per cent of capsicum is marketed in nearby markets, that for tomato stands at 37.8 per cent.

Table 7.2.2. Marketing Pattern of Protected Crops on Sampled Farms

(Qty. in qnt., rate in Rs.)

Category	Sold at							
	Far off market		Sold to others		Local markets		Total	
	Qty	Rate/qnt.	Qty	Rate/qnt.	Qty	Rate/qnt.	Qty	Rate/qnt.
Capsicum (20kg/Box)								
Small	-	-	6.65	3420.79	2.70	4686.33	9.35	3786.24
Medium	-	-	-	-	-	-	-	-
Large	-	-	-	-	-	-	-	-
Overall	-	-	6.65	3420.79	2.70	4686.33	9.35	3786.24
Tomato (25kg/Box)								
Small	-	-	2.95	4480.43	1.79	4405.16	4.75	4452.01
Medium	-	-	-	-	-	-	-	-
Large	-	-	-	-	-	-	-	-
Overall	-	-	2.95	4480.43	1.79	4405.16	4.75	4452.01

Source: Field Survey
Marketing is done by FPO in gross weight and not in boxes of 20/25 Kg. boxes

Table7.2.3. Marketing Costs of Capsicum & Tomato in Nearby Market

(Rs. / Qtl.)

Particulars	Capsicum	Tomato
Gross returns received by grower	5025.62	4476.19
Growers' expenses on		
Picking, packing, grading and assembling	174.46	155.23
Packing material	58.17	54.19
Transportation		
(i.) Carriage up to road head	153.88	140.96
(ii).Freight up to market	0.00	0.00
(iii). Loading / unloading charges	0.00	0.00
Commission of C.A. and market fee	0.00	0.00
Other charges	0.00	0.00
Total expenses paid by the grower	386.51	350.38

Source: Field Survey

7.13 As the vegetable growers are found to have not sold their output to the far-off markets, we have tried to enumerate the costs because of marketing in the local nearby markets instead. This is shown here in table 7.2.3 as follows-

7.14 It can be observed here 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, as stated earlier, the govt. 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. 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 - VIII

Problems Faced by Vegetable Growers

Problems in Growing Off-Season Vegetables Inside Poly houses

8.1 While this section of the study focuses on problems in growing off-season vegetables under polyhouse cover, we will first start with the problems faced by the farmers in adoption and construction of polyhouse.

8.2 It can be observed in table 8.1.1 that the vegetable growers have not faced any problem in adoption or construction of polyhouse. This is particularly because of the fact the construction of polyhouse has been entirely sponsored and shouldered by the state government under provisions of benefit under MIDH scheme. As such, the vegetable growers did not have to face any problem in the construction of polyhouse. The only problem as stated by the vegetable growers is that the contractor unduly delayed the construction of polyhouse; otherwise those had been completed much earlier.

Table 8.1.1. Problems Faced in Adoption and Construction of Polyhouse

(Multiple Responses in %)

Type of Problem	Category			Overall
	Small	Medium	Large	
Information not provided clearly	0.0	-	-	0.0
Cumbersome clearance from department	0.0	-	-	0.0
Delays in technology transfer	0.0	-	-	0.0
Long wait for loan clearance / subsidy	0.0	-	-	0.0
Construction materials not locally available	0.0	-	-	0.0
Contractor delayed the execution	68.0	-	-	68.0
High construction cost	0.0	-	-	0.0
Unavailability of skilled labour	0.0	-	-	0.0

Source: Field Survey

8.3 In case of problems faced relating to inputs availability, it can be observed that the farmers do not complaint on non-availability but there is a strong objection regarding quality and price of inputs available. As Sikkim is a declared 'Organic State', they intend to apply bio-fertilizers and bio-pesticides in replacement of chemical ones. But whatever available to them at the moment is quite expensive. For this, the state government has taken a number of steps to encourage production of

compost at the farm level, which could become readily available and cheap as well for the farmers.

Table 8.1.2. Responses Regarding Problems Faced in Inputs Availability

(Multiple Responses in %)

Type of problem	Category			Overall
	Small	Medium	Large	
Unavailability	0.0	-	-	0.0
Higher prices	64.0	-	-	64.0
Low quality	76.0	-	-	76.0

Source: Field Survey; Marginal=100 mts², Small=200 mts²

8.4 Further, when asked about problem faced in cropping practices, the farmers do not held cultural practices as a bottleneck in the adoption of cultivation under polyhouse. They even do not encounter any problem regarding sowing time in off-season vegetable cultivation under polyhouse cover. However, the major problem in case of cropping practices relates to time and intensity of irrigation. This is understandable considering the fact that the land terrain of Sikkim is hilly, where irrigation is a major problem.

Table 8.1.3. Responses Regarding Problems Faced in Cropping Practices

(Multiple Responses in %)

Type of problem	Category			Overall
	Small	Medium	Large	
Sowing time	0.0	-	-	0.0
Sowing Intensity	32.0	-	-	32.0
Cultural practices	0.0	-	-	0.0
Time and intensity of irrigation	44.0	-	-	44.0

Source: Field Survey

8.5 It is also to be noted here that while asked about problem faced in harvesting, storage, etc., an overwhelming majority of the vegetable growers pointed out that they have problem with storage facilities. In particular, they pointed out that in the absence of storage facilities, they cannot afford to hold stocks, even if they are in a position to do so. As such, they often miss out the best prices for off-season vegetables.

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

(Multiple Responses in%)

Type of problem	Category			Overall
	Small	Medium	Large	
Harvesting	52.5	-	-	52.5
Time	52.0	-	-	52.0
Method	0.0	-	-	0.0
Storage	72.0	-	-	72.0
Packing / Processing	32.0	-	-	32.0
Marketing	48.0	-	-	48.0

Source: Field Survey *Marginal=100 mts², Small=200 mts²*

8.6 Other problems include problems relating to harvesting, picking and packing, in case of which the main objection relates to higher prices of inputs. It is extremely significant to note here that after much effort from the state government, the vegetable growers still complaint about marketing related issues, mainly the distance to the market.

Problems in Growing Off-Season Vegetables Outside Poly houses

8.7 Transportation of vegetable output to the market is one of the major aspects in case of marketing of products. This assumes more importance in a situation where the terrain is hilly like in Sikkim state. There is often problem relating to unavailability of means of transport in the remote parts of a hilly region. It is here that table 8.2.1 focuses on problems of availability of transport faced by the farmers of Sikkim.

8.8 It is apparently clear from table 8.2.1 that an overwhelming majority (65.8%) of farmers are of the opinion that they do not have much problem with transportation of their vegetable output to the local markets. This is particularly because of the fact that most of the farmers are members of FPOs, and the FPOs arrange for daily pickup trucks in the remote areas for transportation of output, which otherwise would be extremely difficult for the farmers. Here, the farmers enjoy the privilege to share costs for transportation of output to market by pickup trucks arranged by the FPOs.

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

(Multiple response %)

Particulars	Not available in time	Higher charges	Any other	No problem
District: East				
Small	23.33	21.67	1.67	63.33
Medium				
Large				
Overall	23.33	21.67	1.67	63.33
District: South				
Small	8.33	16.67	11.67	68.33
Medium				
Large				
Overall	8.33	16.67	11.67	68.33
Overall				
Small	15.83	19.17	6.67	65.83
Medium				
Large				
Overall	15.83	19.17	6.67	65.83

Source: Field Survey

Table 8.2.2.Problems of Packing Material Faced by Sampled Farmers

(Multiple response %)

Particulars	Shortage	High price	Not available in time	No problem
District: East				
Small	6.67	15.00	10.00	71.67
Medium				
Large				
Overall	6.67	15.00	10.00	71.67
District: South				
Small	1.67	21.67	15.00	66.67
Medium				
Large				
Overall	1.67	21.67	15.00	66.67
Overall				
Small	4.17	18.33	12.50	69.17
Medium				
Large				
Overall	4.17	18.33	12.50	69.17

Source: Field Survey

8.9 However, a few of the sample farmers, especially those who are not member of FPOs, often face problems in transport include higher charges of transport (19.1%) and non-availability of vehicles for transport on time (15.8%).

8.10 In case of problems relating to availability of packing material (Table 8.2.2), it is observed that about 69% of the sample farmers do not have much problem with availability of packing material.

8.11 It should be noted here that the farmers mostly access local markets in nearby towns or roadside vegetable markets set up by the FPOs with the help of district authorities. As such, there is no need for expensive packing materials, including boxes, plastic wrappers, cartons, etc. Rather, plywood boxes or jute bags mostly serve the purpose of packing materials for the farmers. Only a few of the farmers are of the opinion that those packing materials also are expensive enough for them to afford and they are not available readily in the off-season.

Table 8.2.3. Problems of Storage Facility Faced by Sampled Farmers

(Multiple response %)

Particulars	No storage facility available	Inadequate storage facility	No problem
District			
Small	66.67	5.00	28.33
Medium			
Large			
All	66.67	5.00	28.33
District			
Small	70.00	1.67	28.33
Medium			
Large			
All	70.00	1.67	28.33
Overall			
Small	68.33	3.33	28.33
Medium			
Large			
All	68.33	3.33	28.33

Source: Field Survey

8.12 Regarding problems faced in storage of output for the sample farmers (Table 8.2.3), it can be observed that an overwhelming majority of farmers from both East and South Sikkim pointed out that there is no storage facility available for their vegetable output. At the same time, it is also clear that for such non-availability of

storage facility there is hardly any problem faced by the farmers, as 28% farmers from both district opined that there is no problem with storage. Only a handful (4%) of farmers is of the opinion that whatever storage facility is available is typically inadequate.

8.13 The above findings pertaining to storage of off-season vegetables is understandable enough. As Sikkim is a hilly state and the temperature is quite low, the necessity for storage for keeping vegetables fresh is limited. Owing to low temperature, the vegetable stay fresh for a long time. At the same time, as almost all the vegetable growers are marginal or small farms, they usually sell off their product immediate after harvest in the nearby market, and there is little unsold vegetables kept for selling in future.

8.14 A similar situation is reflected in case of problems relating market intelligence (Table 8.2.4), where the farmers are of the opinion that there are a numerous problem regarding market information. In fact, 75% of farmers have information for only a few nearby markets, that too seems to be mostly inadequate (51.6%), misleading (16.7%) and delayed (20.8%).

Table 8.2.4.Problems of Market Intelligence Faced by Sampled Farmers

(Multiple response %)

Particulars	Late information	Available for few markets	Inadequate information	Misleading information	No problem
District					
Small	33.33	58.33	13.33	20.00	3.33
Medium					
Large					
All	33.33	58.33	13.33	20.00	3.33
District					
Small	8.33	91.67	90.00	13.33	8.33
Medium					
Large					
All	8.33	91.67	90.00	13.33	8.33
Overall					
Small	20.83	75.00	51.67	16.67	5.83
Medium					
Large					
All	20.83	75.00	51.67	16.67	5.83

Source: Field Survey

8.15 In practice, it is observed that most of the vegetable producers are members of FPOs and (or) cooperative societies, who help a lot in marketing of their output. As such, the farmers are typically unaware of market information, and have little interest in market intelligence. In fact, they have too little to sell at the markets to influence price, as also do not have much option but to take the existing market price (often set by the market authorities / FPOs / local bodies) as granted.

8.16 As the local bodies mostly regulate the markets and the farmers sell their output themselves through FPOs, there is little scope for undue deductions, quoting lesser price, deducting more charges or existence of multiplicity of charges. The major problems, particularly for the marginal farmers of both the East and South districts, are late payments (62.5%) and part payments (26.67%) as opined by the farmers. This is because the farmers often sell their output to FPOs, who in turn take the responsibility of marketing of their products. However, in the process, there are often late / part payments involved, which is quite problematic for these marginal farms. Nonetheless, a good proportion of farmers (23.3%) are of the opinion that there is not much mal-practice associated in the market.

Table 8.2.5. Problems of Mal-Practices 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
District							
Small	-	40.00	61.67	-	-	-	20.00
Medium							
Large							
All	-	40.00	61.67	-	-	-	20.00
District							
Small	-	13.33	63.33	-	-	-	26.67
Medium							
Large							
All	-	13.33	63.33	-	-	-	26.67
Overall							
Small	-	26.67	62.50	-	-	-	23.33
Medium							
Large							
All	-	26.67	62.50	-	-	-	23.33

Source: Field Survey

Chapter - IX

Conclusions and Policy Implications

Main Findings

9.1 In spite of significant contribution of Horticulture Sector to Sikkim state's economy of North Eastern Region, there is dearth of authentic data related to cost and return in this sector. The present study therefore intends to collect data on cost and return of off season vegetables in protected and unprotected cultivation of some important horticulture crops of the Sikkim. After detailed analysis of primary data collected through field survey and available secondary data, the study arrives at the following main findings-

9.2 Since 2007-08 to 2015-16, the state of Sikkim has witnessed rapid growth in vegetable and horticulture cultivation. Area under vegetable production has increased from 20,267 thousand hectares to 26,484 thousand hectares over the specified time, an increase of about 30.68 per cent.

9.3 While the sample pool has been dominated by ST, SC and OBCs respectively with their corresponding presence in relation to overall sample size. Only 10 per cent of sample households belong to the general category, the educational standards of farmers are fairly good. In the group of agricultural labourers, females dominate over their male counterparts.

9.4 The pattern of cost structure clearly indicates that the marginal farmers use more of family labour for vegetable cultivation while small farmer are capable of hiring labour services. Marginal farmers, being faced with resource crunch, generally are not in a position to employ more hired labour for crop enterprise in comparison with their small counterparts.

9.5 Net return over total cost (Cost C) had also been higher among the marginal farmers in comparison with the small cultivators with variations across districts and farming classes.

9.6 For all the vegetables concerned, it comes out that the vegetables are mostly marketed in the local markets only, as most farmers sell their output to FPO (Farmer

Producers' Organization) to ensure efficient marketing mechanism, whereas the FPOs sell their output in the local markets.

9.7 On the part of the expenses incurred by the vegetable growers to bring their products up to the market, 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.

9.8 In Sikkim, it was observed that all the polyhouse structures have been constructed with 100 per cent subsidy by the government. Beneficiaries under the MIDH scheme had to provide land only for the polyhouse, while the rest is done by the contractors on behalf of the government.

9.9 As the vegetable growers are small in size of operation (100m^2 and 200m^2 of polyhouse cover), the use of hired labour is extremely low. Costs of cultivation for both capsicum and tomato under polyhouse cover stand less than Rs.2500/- per polyhouse.

9.10 It seems that organic farming techniques for these vegetable growers may have resulted into lower yield, but the cost advantages of organic cultivation and extensive used of family labour has ultimately led to higher profits (farm business income) earned by the vegetable growers of Sikkim.

9.11 In case of capsicum, while about 1.5 per cent of production is retained for consumption that for tomato is comparatively higher at 4.6 per cent of production. Taking all farmers together, the total loss stands at 2.7 per cent and 2.9 per cent of production in case of capsicum and tomato respectively.

9.12 About 71.1 per cent of capsicum production and 62.2 percent of tomato production is sold this way 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.

9.13 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.

9.14 As construction of polyhouse has been entirely sponsored and shouldered by the state government under provisions of benefit under MIDH scheme, the vegetable growers did not have to face any problem in the construction of polyhouse.

Policy Implication:

9.15 Based on the finding of the present study, the following policy implications come out to be mentioned in this respect. These are as follows-

- As Sikkim has the favourable climatic conditions for growing vegetables, flowers and horticultural crops, policies like MIDH should be obviously help augment growth in agriculture, especially in hilly regions of Himalayan like Sikkim with proactive state cooperation. Hence, *the policy makers should consider allocating a higher budget* for these states or implement similar schemes in vegetables, floriculture and horticulture.
- Cultivation of vegetables under polyhouse cover in organic cultivation technique comes out to be a remunerative proposition for the resource poor farmers also, generating greater employment opportunities for marginal farmers, especially for the female family members. As such, *steps to promote off-season vegetable cultivation under polyhouse cover should be taken up, so that the redundant labour force can be optimally utilized* in agriculture at large.
- As in 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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Appendices

Season wise Area, Production & Productivity of Different Horticulture Crops from 2007-08 to 2011-12

Sl.	Crops		2007-08	2008-09	2009-10	2010-11	2011-12
I.	**VEGETABLES**						
	a) Kharif Veg.	Area	3.557	3.639	3.89	4.033	4.081
		Production	16.59	16.979	20.133	20.991	21.949
		Productivity	4664	4666	5175	5205	5266
	b) Rabi Veg.	Area	4.025	4.278	4.54	4.897	4.965
		Production	17.910	19.085	22.27	24.28	24.961
		Productivity	4449	4452	4905	4958	5027
	c) Off-season Veg.	Area	4.261	4.864	5.25	5.475	5.540
		Production	20.51	23.422	28.455	29.929	30.645
		Productivity	4813	4815	5420	5466	5531
	Total Veg.	**Area**	**11.843**	**12.79**	**13.68**	**14.405**	**14.586**
		Production	**55.01**	**59.486**	**70.875**	**75.2**	**77.10**
		Productivity	**4645**	**4651**	**5180**	**5220**	**5285**
II.	**ROOTS & TUBER CROPS**						
	a) Kharif	Area	3.918	4.045	4.8	4.95	5.148
		Production	16.605	16.837	21.801	22.498	23.062
		Productivity	4238	4162	4162	4545	4479
	b)Rabi Potato	Area	3.9	4.026	4.35	4.485	4.62
		Production	18.592	18.852	22.49	23.212	24.029
		Productivity	4767	4682	5170	5175	5201
	Total Potato	Area	7.818	8.071	9.15	9.435	9.768
		Production	35.197	33.689	44.291	45.71	47.091
		Productivity	4502	4174.10	4840	4845	4821
	c) Others Root & Tubers	Area	0.606	0.626	0.65	0.675	0.676
		Production	2.825	2.864	3.316	3.45	3.461
		Productivity	4662	4575	5101	5111	5119

Source: Govt. of Sikkim

Data on Input, Price, Area, Production and Productivity of Vegetable Crops from 2009-10 to 2014-15

Crops	Particulars	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Kharif	Area (000 Ha)	3.711	3.748	4.081	4.111	4.236	4.450
	Production (000 MT)	17.318	17.491	21.494	22.234	22.443	23.565
	Productivity	4.759	4.806	5.266	5.408	5.294	5.295
	Price (per MT)	5,000.00	5,500.00	6,000.00	6,000.00	7,500.00	9,000.00
Rabi	Area (000 Ha)	4.106	4.167	4.965	5.040	5.157	5.311
	Production (000 MT)	19.220	19.508	24.961	25.820	26.112	26.895
	Productivity	4.775	4.846	5.027	5.123	5.063	5.064
	Price (per MT)	6,000.00	7,000.00	7,000.00	7,500.00	8,000.00	12,000.00
Off-season	Area (000 Ha)	4.961	5.085	5.540	5.655	5.762	6.031
	Production (000 MT)	23.890	24.487	30.645	31.701	32.421	32.665
	Productivity	4.911	5.033	5.531	5.605	5.627	5.416
	Price (per MT)	12,000.00	14,000.00	15,000.00	15,000.00	16,000.00	15,000.00
Total Veg. Crops	Area (000 Ha)	12.778	13.000	14.586	14.806	15.158	15.792
	Production (000 MT)	60.428	61.486	77.100	79.755	80.976	83.125
	Productivity	14.445	14.685	15.825	16.136	15.984	15.775
Potato Kharif	Area (000 Ha)	4.125	4.166	5.148	5.300	5.400	5.560
	Production (000 MT)	17.173	17.344	23.062	23.982	24.210	24.370
	Productivity	4.245	4.287	4.479	4.525	4.483	4.390
	Price (per MT)	12,500.00	14,000.00	15,500.00	16,000.00	16,500.00	25,000.00
Potato Rabi	Area (000 Ha)	4.086	4.118	4.620	4.755	4.840	5.130
	Production (000 MT)	19.134	19.287	24.029	25.153	25.650	25.950
	Productivity	4.752	4.790	5.201	5.290	5.300	5.060
	Price (per MT)	11,000.00	12,500.00	14,000.00	15,500.00	16,000.00	15,000.00
Total Potato	Area (000 Ha)	8.211	8.285	9.768	10.055	10.240	10.690
	Production (000 MT)	36.307	36.631	47.091	49.135	49.860	50.320

Source: Govt. of Sikkim

Annexure - I

Coordinator's Comments

1. Title of the draft report examined:

The title should be:

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

2. Date of assignment receipt to the coordinator: 24.03. 2017

3. Date of dispatch of the comments: March 25.03, 2017

4. Comments on the objectives of the study:

All the objectives of the study have been achieved.

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

a) Executive summary should be in single column as per the guidance of the Ministry. In Executive Summary, Main findings may be in paragraphs whereas Policy Implications in bullets as given already.

b) Numbering of paragraphs should be in continuation within the chapters. Numbering of the heading should be removed as per the guidance of the Ministry.

c) The objectives may be in bullets.

d) Page 16: It should be written as "Medium farmer, having total operational holding above 2. Ha".

e) As per the peer reviewer's suggestion, Table-3.3 may indicate the state average productivity as well against the vegetable crops under reference. Trend equation can be fitted for the data presented in Table 3.4 & Table 3.5. Additionally, the compound annual growth rate (CAGR) can be worked out for area and production.

f) Table 4.2. (a-c and 4.3): Only give the percentages.

g) Table 4.4. : Remove (Area in hectare / farm) from the top and give percentages in whole the table and Area in hectare / farm in 4th column in parenthesis along with percentages.

h) Table 4.4: Give only the percentages.

i) Table 4.12 (a,b): Crop rotation should be in terms of months of sowing/planting and harvesting. Please check the headings also.

j) Table 6.1. (a-e) In second column give Qtls./farm and in other columns only percentages.

k) Page 81: per cent only should be corrected.

l) As informed earlier, the tables 6.2(a-f) should be 6.3(a-f) and 6.3(a-b) should be 6.2(a-b).

m) Table 6.3 (b) should contain only Percentages to total production of Losses in Vegetables up to Market on Sampled Farms.

n) Table 6.4 (a-b): Give fig. of the consumer's price. This cannot be na.

o) Tables 6.5 &6.6. : Delete these tables as informed earlier.

p) Table 7.2.1. The production should be in boxes/polyhouse in a year. The weight of a box is already given, so the production in Qtls. can be covered into boxes. This is necessary to have uniformity of all the studies. This should be followed in Table 7.2.2 also.

q) Table 8.2.1 to Table 8.2.5: Give only percentages.

r) Chapter 9: Give only two headings, that is, Main Findings and policy Implications. Main findings should be in numbered paragraphs as to be done in other chapters. Policy Implications should be in bullets.

s) Proper editing of the manuscript may be done to avoid mistakes, typographical or otherwise

Overall view on the acceptability of the report:

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

Annexure - II

Action Taken Report

1. Title of the report:

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

2. Date of receipt of comments from the coordinator: 25.03.2017

3. Date of dispatch of the final report: 25.04.2017

4. Specific actions taken:

a) All suggested changes and modifications have been incorporated / addressed, except comment (i) relating to table 4.12 (a,b).

b) In case of table 4.12 (a,b), no changes have been made. The questionnaire prepared for the study does not have any question regarding crop rotation by months of sowing / planting / harvesting, and hence suggested changes cannot be done. Please refer to questionnaire for the study.

Authors