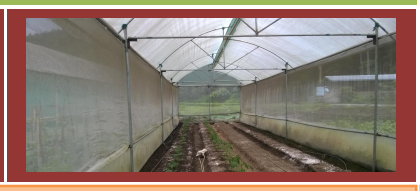
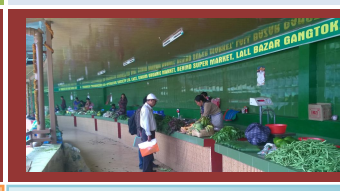
Study Number – 186

An Economic Analysis of Protected Cultivation under MIDH in Sikkim





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Study sponsored by Ministry of Agriculture and Farmers Welfare
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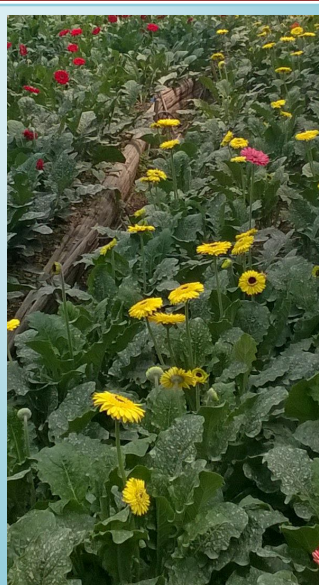

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Preface

The present study entitled "An Economic Analysis of Protected Cultivation under MIDH in Sikkim" has been assigned by the Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi with full financial endorsement and under the close coordination of Agro-Economic Research Centre (AERC), Himachal Pradesh, Shimla.

Besides increasing productivity, protected farming is also expected to provide employment opportunities to the unemployed youth making it an attractive agricultural option for the farmers as well as rural service providers. Based on both primary as well as secondary data collected from the state of Sikkim, the present study evaluated the impact of Protected Cultivation under Mission for Integrated Development of Horticulture (MIDH) on crop productivity and income of farmers. It also examined the level of adoption and its constraints in the application of protected cultivation in the state of Sikkim.

The present study was conducted by Mr. Vivekananda Datta, Dr. Dabajit Roy, Mr. Kali Sankar Chattopadhyay and Mr. Debanshu Majumder of this Centre. They were assisted by Mr. Ashok Sinha, Dr. Ranjan Kumar Biswas and Mr. Rishav Mukherjee in field survey, data entry and tabulation. Typing of the report was done by Mr. Munshi Abdul Khaleque and Mr. Nityananda Maji. Secretarial assistance for the study was provided by Mr. D. Mondal, Mr. D. Das, Mr. P. Mitra and Mr. A.R. Patra. Mr. B. Singh and Mr. S. Hansda also extended support service for conducting this study.

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.

We acknowledge the niceties of Prof. Swapan Kumar Dutta, Vice Chancellor (Officiating), Visva-Bharati, Madam Ms. Sangeeta Verma (Economic and Statistical Adviser) and Shri P. C. Bodh (Adviser-AER Division) of Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, and Prof. Bidhan Chandra Roy, Hony. Deputy Director, AERC, Visva-Bharati for their guidance and necessary support in completion of the study.

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 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.

A.E.R.Centre, Visva-Bharati
Santiniketan
September, 2017.

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Executive Summary

Background

Sikkim is an agrarian State with 64 per cent people dependent on Agriculture and allied activities. State Government has given emphasis to the horticulture sector with a view to attain higher levels of rural prosperity by adopting the policy of 'growth with sustainability' for higher income generation to farming community. The main objective lies on securing maximum production of horticulture crops and managing primary agro-resources like soil, water and bio-diversity. Large cardamom, ginger and turmeric are the major spice crops, while mandarin orange, guava, mango, banana are the principal fruits grown in the State. Sikkim is also a paradise for flowers. Gladioli, anthuria, lilies, primulas, rhododendrons, orchids as well as many other floral species thrive here. The Department of Horticulture and Cash Crop Development (HCCDD) is involved in motivating and providing technical guidance to local farmers and taking forward the mission of the Government towards Horticulture Development in Sikkim. The Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in Sikkim since 2001-02. From April 2014 onwards, HMNEH has been subsumed under Mission for Integrated Development of Horticulture (MIDH), for the holistic growth of the horticulture sector covering fruits, vegetables, root & tuber crops,

Due to population growth coupled with increasing pressure on natural resources i.e. land & water, decreasing land holdings, climate change, rising income level, and fast increasing demand for quality horticultural fresh produce, people are forced to shift towards modern technologies of crop production like protected cultivation. In Sikkim, however, the climatic conditions and rich bio-diversity give ample opportunity for such cultivation under protected conditions. Protected cultivation leads to conversion of some portion of existing area under vegetable cultivation, towards high value crops for higher income round the year. Activities like construction of green houses, shade net house, plastic mulching, and plastic tunnels, anti bird / hail nets are promoted under the MIDH. National Horticulture Board (NHB) is also implement the projects having area above 2500 sq. m. wherein provision were made for selecting a variety of construction material for green houses and shade net houses. The present study is an attempt to assess the inpact of MIDH with the following specific objectives:

- To study the progress in providing assistance for establishing the poly houses under MIDH programme and to examine the expenditure incurred in establishment of poly houses and means of financing.
- To study the economics of production of flowers and vegetables under protected conditions in the State and to analyse the worth of protected cultivation venture.
- To analyse the systems adopted for marketing the produce under protected conditions in the State.
- To examine the problems faced by the farmers in production and marketing of Flowers and vegetables under protected conditions in the State.

The study is based on survey conducted in two districts viz. East Sikkim & South Sikkim. These two districts were selected on the basis of highest number of poly-houses. Following the same criteria, two development blocks, one from each district were selected purposively. Accordingly the Gangtok block from East Sikkim and Namchi block from South Sikkim were selected. In the next stage, all the registered poly-houses and a sample of 25 vegetable growers and 25 farmers cultivating flowers were selected randomly from each block. Thus, the study is based on 100 farmers cultivating in poly-houses in two districts.

The sample is classified into three size classes based on the size of the poly houses. The polyhouses covering an area less than 250 square meters are considered small, while those between 250 square meters to 500 square meters are considered medium in size. Those with moth than 500 square meters cover area to less than 1000 square meters of cover area are considered large farms. In Sikkim, however, in both two districts, all 100 sampled polyhouse owners turned out to be small (less than 250 m^2).

Major Findings:

i) In case of polyhouse development under MIDH in Sikkim, it is found that Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in all the districts of Sikkim.

ii) An area of 415.96 ha has been covered under protected cultivation, while 48835 farmers have been trained under various horticulture activities.

iii) An amount of Rs. 373.47 crore was released to the State till 2014-15 and the State Government has reported an expenditure of 328.97 crore.

iv) Average family size of the small farmers is 4.21 with high educational standards. The major primary occupation is farming, while the subsidiary occupation is self-employment in non-farming sector.

v) Average net operated area is 1.05 ha, and 38 per cent of total cultivated land is irrigated.

vi) A major portion of non-farm income for the farm households comes from salary, followed by animal husbandry and petty business.

vii)) The sample polyhouses are simple in design with single-tier cultivation only. Information regarding polyhouses and scheme/subsidy has been obtained from the state department of agriculture itself, and from friends & relatives to limited extent.

viii) Continuous efforts by the Government Officials, easy access to technologies, availability of subsidy, and possibility of higher income acted as key motivating factors for protected cultivation in Sikkim.

ix) Besides the contractor's delay in construction of polyhouses, adjustment with the new crop growing technology has been found to have acted as hindrances for the growth of protected cultivation. However, the implementing authority took a supportive/neutral role in the supervision of polyhouse construction.

x) It comes out that majority of the farmers are yet to adjust with the new cropping practices introduced, especially organic cultivation, while all the farmers suggested improvement of storage facilities.

xi) It was observed that equipments like heater, cooler, humidifier, and fogger are absent in all of the poly-houses. Only 60 per cent of farms are provided with drip irrigation facilities. Fifty two per cent of farms have built vermi-compost pits.

xii) It is observed that 60 per cent of the farmers received training from the government sources, while 39 per cent of them are benefitted from the nearby Krishi Vigyan Kendra.

xiii) It is observed that in case of carnation and jarbera, the selected flower crops for the study grown under polyhouse cover, an overwhelming proportion of total costs are spent on purchasing sapling for producing carnation flower followed by costs of pesticides (organic), formation of beds and for application of fertilizer (organic).

xiv) It was observed that though cost for cultivation for jarbera under protected condition is significantly higher in comparison to carnation, percentage of net returns in jarbera over carnation is also higher and it is due to higher value of output.

xv) In case of the selected vegetable crops under polyhouse cover, viz. capsicum and tomato, it has been observed that net returns in case of tomato is marginally lower than in case of capsicum cultivation.

xvi) Cultivation of paddy and maize in Kharif season and cabbage and cauliflower in Rabi season are the other significant crops grown by the sample farms in unprotected condition. Except paddy, the cost for absorption of family labour in all other unprotected crops has been found to be higher in marginal farmers than the small farms.

xvii) As far as productivity of crops on unprotected condition of farming is concerned, it is observed that apart from paddy, productivity of all crops for marginal farms is marginally higher than small farms.

xviii) The government of Sikkim has formed FPOs (Farmers-Producers-Organizations), who collect vendible commodities from the farmer and pay the price. For this purpose one motor van (pick-up van) for each FPO has been provided to collect farmers' product from the assemble point (mutually convenient place of the village cluster) and then to dispose it in the nearby market.

xix) Losses in the process of production of flowers like carnation and jarbera are quite high at 4.54 per cent and 4.25 per cent respectively as proportion of their respective production. Payment of wages in flowers is not observed, while retention for family and for gifts to others constitutes a very small proportion of production of both these flowers.

xx) In case of utilization of vegetable crops, it can be observed that losses in relation to production accounts for 2.70 per cent of production for capsicum and 2.55 per cent of production for tomato. Retention for family consumption is higher for tomato (4.64 per cent) than capsicum (1.46 per cent) of production.

xxi) In case of marketing pattern of the protected flower crops, it can be observed that both the flowers are sold only in the local markets, and not to far-off markets. In fact, it can be observed that more than 63.63 per cent of carnation marketed and 61.24 per cent of jarbera marketed has been sold directly to the consumers through FPOs in organic kiosks or in road-side kiosks by the flower growers themselves.

xxii) In case of marketing pattern of the protected vegetable also, we can observe that 71.12 per cent of total capsicum marketed and 62.24 per cent of total tomato marketed is sold directly to the consumers in organic kiosks or road-side markets set up by the government, while the rest is sold in nearby towns through FPOs.

xxiii) The entire marketing process is set up by the state government, and hence presence of middlemen and other intermediaries are not found. Market fee and other such costs are also not observed as the markets are set up and controlled by the government itself.

xxiv) It can be observed here that total expenses borne by the farmers for marketing of carnation stands at 8.18 per cent, while that for jarbera stands at 7.66 per cent of net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.

xxv) In case of capsicum, the total expenses borne by the grower on account of marketing stands at 7.82 per cent, while that for tomato stands at 7.81 per cent of net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.

xxvi) Total production losses for the selected crops carnation, jarbera, capsicum and tomato are 4.54 per cent, 4.25 per cent, 2.70 percent and 2.55 per cent respectively.

xxvii) In case of carnation and jarbera, loss of production occurs primarily while picking of flowers, while the major source of production loss in case of selected vegetables comes out to be pre-harvest losses and losses in transportation.

Policy Implications:

- As Sikkim has the favourable climatic conditions for growing vegetables, flowers and horticultural crops, policies like MIDH help in augmenting growth in agriculture, especially in vegetables, flowers and horticultural crops. 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 seems to be a remunerative proposition for the resource poor farmers also. Therefore, steps need to be taken to promote off-season vegetable cultivation under polyhouse so that the excess labour force can be optimally utilized in agriculture at large.
- 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

Background

1.1 Sikkim is basically an agrarian State with 64 per cent people dependent on agriculture and allied activities, and about 15 per cent of the Gross State Domestic Product (GSDP) comes from agricultural and horticultural sector. Therefore, for attaining a higher standard of rural livelihood, the State Government has accorded priority to these sectors. At the same time the Government of Sikkim has the concern for preserving primary agro-resources like soil, water and bio-diversity. Hence, strict norms of organic farming are being enforced for protecting the environment as well as the flora and fauna in the state.

1.2 Sikkim produces about 0.24 m MT of horticulture produce from an area of 0.07 m ha. The major horticulture production constitutes vegetables (54.5%), spices (24.7%) and fruits (9.9%). Large cardamom, ginger and turmeric are the major spice crops, while mandarin orange, guava, mango, banana are the principal fruits grown in the state. Flowers like gladioli, anthuriums, lilliums, primulas, rhododendrons and different kinds of orchids thrive here. The Department of Horticulture and Cash Crop Development (HCCDD) is involved in motivating and providing technical guidance to local farmers and taking forward the mission of the Government towards Horticulture Development in Sikkim. In the process, the Department has initiated steps to strengthen existing horticulture infrastructure, availability of inputs and technological know-how to the farmers.

1.3 The Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in Sikkim since 2001-02. From April, 2014 onwards, HMNEH has been incorporated under Mission for Integrated Development of Horticulture (MIDH) for holistic growth of the horticulture sector. Crops under this scheme cover fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants and plantation crops.

1.4 While Government of India (GOI) contributes 85 per cent of total outlay for developmental programmes in all the states except the states in North East and Himalayas, 15 per cent share is contributed by State Governments. In the case of North Eastern States and Himalayan States, GOI contribution is 100 percent.

Main objectives of the Mission are:

a) To promote holistic growth of horticulture sector, through area based regionally differentiated strategies.

b) To encourage aggregation of farmers into farmer groups like FIGs/FPOs and FPCs to bring economy of scale and scope.

c) To enhance horticulture production, augment farmers' income;

d) To improve productivity by way of quality germplasm, planting material and water use efficiency through micro irrigation; and

e) To support skill development and create employment generation opportunities for rural youth in horticulture and post harvest management, especially in the cold chain sector.

In order to achieve above objectives, the mission adopted the following strategies:

a) Adopt an end-to-end holistic approach covering pre-production, production, post harvest management, processing and marketing to assure appropriate returns to growers/producers;

b) Promote R&D technologies for cultivation, production, post-harvest management and processing with special focus on cold chain infrastructure for extending the shelf life of perishables;

c) Improve productivity by way of quality through:

   i. Diversification, from traditional crops to plantations, orchards, vineyards, flowers, vegetable gardens and bamboo plantations.

   ii. Extension of appropriate technology to farmers for high-tech horticulture including protected cultivation and precision farming.

iii. Increase of acreage of orchards and plantation crops including bamboo and coconut, particularly in states where total area under horticulture is less than 50% of agricultural area

d) Improve post harvest management, processing for value addition and marketing infrastructure.

e) Adopt a coordinated approach and promote partnership, convergence and synergy among R&D, processing and marketing agencies in public as well as private sectors, at the national, regional, state and sub-state levels;

f) Promote FPOs and their tie up with Market Aggregators (MAs) and Financial Institutions (FIs) to support and adequate returns to farmers.

g) Support capacity-building and Human Resource Development at all levels, including, change in syllabus and curriculum of graduation courses at Colleges, Universities, ITIs, Polytechnics, as appropriate.

Protected Cultivation

1.5 In view of the increasing population pressure, climate change, decreasing land holdings, and high demand of quality horticultural produce one is forced to shift towards modern technologies of crop production like protected cultivation. In Sikkim, however, the climatic conditions and rich bio-diversity give ample opportunity for such cultivation under protected conditions. Presently area under protected cultivation of horticultural crops is only around 40,000 ha and out of which large portion mostly in northern parts of India is not successfully being utilized for protected cultivation. Promotion of protected cultivation in addition helps in creation of huge self-employments for unemployed educated youths. At the same time also raises the national economy by sale of high quality produce in domestic and international markets. In a situation when global trade scenario is changing rapidly there exist high potential for enhancing the income of farmers opting for quality and offseason vegetable and cut flower cultivation under protected conditions.

1.6 Production of vegetable and cut flower crops under protected conditions not only provides high resource use efficiency but it has potential to increase the productivity by many folds over open field cultivation of these crops under varied agro climatic conditions of the country.

1.7 But at the same time this technology requires very careful planning and management about timing of production. It is important that harvest time to coincide with the scarce period of availability of vegetables in market. It enables the cultivators to earn more with prevailing high market prices during the deficient supply period.

1.8 There are many studies designed to assess the impact of protected cultivation (Mahesh, K., 1996; Spehia, R. S., 2015; Singh H., 2015; Choudhuri, A. K., 2016; Tiwari, Y., 2014; etc.). While some studies have drawn attention to the leakage in the implementation of the scheme, most of the studies have drawn the success stories of protected cultivation.

1.9 According to Dr. Harmanjeet Singh (Singh, H., 2015) "Hilly topography of the region limits the possibility of increasing cropping area and intensification of cropping systems. Therefore, poly houses can make small holdings viable by producing maximum from limited land, overcoming vagaries of nature and diversification to high value vegetable crops. It can also stabilize production system in addition to quality improvement through utilization of vertical space and precision farming. Further, these structures can facilitate crop production in areas where vegetable production during extreme weather conditions is not possible".

1.10 Prof. Anil K. Choudhuri (2016) said that "In protected cultivation, high-value cash crops, vegetables and flowers are grown and managed under controlled conditions with higher per unit productivity and profitability. Protected cultivation has become a new agri-entrepreneurship in HP with the support of state and central governments".

1.11 Prof. Yogesh Tiwari (2014) in his study on economics of production and marketing of flower under protected cultivation in Madhya Pradesh, found that total cost in gerbera production grown on an average 1200 m^2 were Rs 757672 out of

which share of operational and fixed cost was 35:65. In rose production total cost incurred was also at par with gerbera (Rs 735431) and more than two - third contribution was of fixed cost. The annual gerbera and rose production on sample poly house 409288 and 342000 flowers respectively which is 108 and 76% higher than the break- even level, Net profit was to the extent of Rs 529868 and Rs 345288 and benefit- cost ratio was 1:70 and 1:46 respectively. Thus, existing production technology yields sufficient profit to the cut flowers growers. Major portion of produce was disposed off through channel III because producer gets maximum of gerbera and rose price per bag in channel III i.e. Rs 680 and Rs 710. Price spread ranged between Rs 190 to Rs 300 in gerbera and Rs 180 to 340 in rose. Producer share in consumer price was 76.2, 66.6 and 69.3% in respectively channel I to channel III. Huge investment requirement, Shortage of trained manpower, Price fluctuation, cold storage facilities were the important production and marketing constraints reported by sample respondents. These constraints should be minimized to augment production and profit of cut flower growers in the study area.

1.12 Vegetable and cut flowers have ample marketing opportunity in the big cities of the country and is regularly inviting attention of the cultivators for diversification from traditional ways of crop cultivation to such modern methods. Even the unemployed educated youths who are not attracted or interested in traditional agriculture are also showing good interest and can be further motivated for this kind of modern agricultural technologies

1.13 Activities like construction of green houses, shade net house, plastic mulching, and plastic tunnels, anti bird / hail nets are being promoted under the Mission. And efforts are being given to motivate local population and local craftsmanship.

Objectives of the Study:

1.14 In view of such a nationwide movement of bringing about a change in the production technology for enhancing crop production the present study attempt to assess the impact of protected cultivation of few crops in the North-Eastern state, Sikkim. The study has following objectives -

- To study the progress in providing assistance for establishing the poly houses under MIDH programme and to examine the expenditure incurred in establishment of poly houses and means of financing.
- To study the economics of production of flowers and vegetables under protected conditions in the State and to analyze the worth of protected cultivation venture.
- To analyze the systems adopted for marketing the produce under protected conditions in the State.
- To examine the problems faced by the farmers in production and marketing of Flowers and vegetables under protected conditions in the State.

Organization of the Report

1.15 The study has been divided into nine chapters. The subject matter of the first chapter is introducing the problems and to present the objectives of the study. The second chapter narrates the methodology adopted, including sampling frame, for the study. In the third chapter provides present scenario of poly house cultivation in the State taking into consideration various schemes available to farmers for adoption of this technology. The socio-economic features of the sampled poly house farmers have been presented in fourth chapter. Fifth chapter concentrates on motivational factors and hindrances encountered by the farmers during the whole adoption and construction process and the costs involved in its construction. Costs and returns from crops grown in the protected environment form the sixth chapter of the study. In the seventh chapter the marketing system of the protected crops has been presented. Eighth chapter highlights various problems encountered by farmers in various operations and stages of cultivation. Conclusions and policy implication is presented in the ninth chapter of the study.

Chapter- II

Methodology

2.1 The evaluation study of the impact of protected cultivation under "Mission for Integrated Development of Horticulture (MIDH)" scheme envisages considering as a wholesome approach to find out proper impact of the scheme at the ground level. Keeping in view the scope of work, with the understanding of the objectives, the approach and methodologies adopted are summarized in the following paragraphs.

Approach

2.2 The approach adopted for the present impact evaluation study is based on use of both the secondary data as well as primary data collected from Sikkim state through conducting interviews of various stakeholders.

The study comprised primarily adopting the following steps:

- Selected Beneficiaries who availed the assistance to install Playhouses.
- Collection and review of reports, documents, government policies, plans and programs.
- Field survey in the selected areas.
- Analysis of secondary and primary data using appropriate tools.

Methodology

2.3 Based on above approach, following methodology is adopted to carry out the evaluation study.

2.4 In Sikkim, two districts viz. East Sikkim (Gangtok) and South Sikkim (Namchi) have been purposely selected on the basis of highest number of poly-houses.

2.5 Two development blocks from each selected districts have been selected again on the basis of highest incidence of poly houses. From East Sikkim, the selected Development Blocks are Gangtok and Assamlinzey. The corresponding selected Development Blocks in South Sikkim are Namchi and Gumpa Ghurpisey. In each District the registered poly houses are being listed accordingly and from this list a

sample of 25 vegetable growers and 25 number of flower growers scattered in these blocks were randomly selected. Thus, the study is based on 100 farmers cultivating in poly-houses in two districts. The farmers are selected from the cluster of villages with due consultation with the appropriate extension personnel of the Department of Horticulture, Government of Sikkim.

Table 2.1. Selection Area of the Sample

District	Blocks	Villages
East Sikkim	Gangtok	Basi Elakha (26)
	Assamlinzey	Sazong Rumtek (24)
South Sikkim	Gumpa Ghurpisey	Gumpa Gurpisi (22)
	Namchi	Jaubari (11)
		Upper Ghurpise (17)

Sources of Data Collection

2.6 The primary data has been collected through participatory discussions and canvassing a well structured questionnaires built considering various evaluation parameters from the competent stakeholders viz., farmers and officials of horticulture departments etc.

2.7 Secondary data regarding physical and financial targets & achievements was obtained from Ministry of Agriculture & HMNEH. Other sources of published data such as NHB statistics, Published research in the reputed journals, Government of India publications as well as Statistics from State and District level have been utilized for secondary data.

Classification of sample

2.8 The sample is classified into three size classes on the basis of the size of the poly houses. The preliminary enquiries have indicated that there are predominantly three sizes of poly houses in the State. These are poly houses covering an area of about 100 square meters and 200 square meters in sharp contrast of existing of 250 mts^2, 500mts^2 and 1000mts^2 in other states for the small .medium and large farming categories. In view of the availability of sizes of poly houses in Sikkim all the

selected farmers starting from 100 mts^2 to 200 mts^2 are clubbed into one category and classified as small farmers.

Table 2.2. Classification of Sampled Poly house Owners under MIDH

(No.)

District	Size class			All
	Small Up to (250 M^2)	Medium Up to (500 M^2)	Large Up to (1000 M^2)	
East Sikkim	50 (100.0)	0.00 (0.0)	0.00 (0.0)	50 (100.0)
South Sikkim	50 (100.0)	0.00 (0.0)	0.00 (0.0)	50 (100.0)
All	100 (100.0)	0.00 (0.0)	0.00 (0.0)	100 (100.0)

Note. Figures in parentheses denote percentages.

Table 2.3. Social Classification of Sampled Poly House Owners

(No.)

Particulars	Small	Medium	Large	All
East Sikkim				
SC	0 (0.0)	-	-	0 (0.0)
ST	44(88.0)	-	-	44(88.0)
OBC	6(12.0)	-	-	6(12.0)
General	0 (0.0)	-	-	0 (0.0)
Total	50 (100.0)	-	-	50 (100.0)
South Sikkim				
SC	0 (0.0)	-	-	0 (0.0)
ST	34 (68.0)	-	-	34 (68.0)
OBC	16 (32.0)	-	-	16 (32.0)
General	0 (0.0)	-	-	0 (0.0)
Total	50 (100.0)	-	-	50 (100.0)
Overall				
SC	0 (0.0)	-	-	0 (0.0)
ST	78 (78.0)	-	-	78 (78.0)
OBC	22 (22.0)	-	-	22 (22.0)
General	0 (0.0)	-	-	0 (0.0)
Total	100 (100.0)	-	-	100 (100.0)

Note. Figures in parentheses denote

2.9 In case of unprotected cultivation the usual norms in classifying farmers have been adopted wherein farmers within the range of net operated area of less than one hectare labeled as marginal farmer, and more than 1 ha as small farmers, respectively.

2.10 The social classification of the respondent farmers is given in Table 2.3. It is seen from the Table that overall 78 percent of the respondents belong to the Scheduled

Tribes (ST) category and rest represents the Other Backward Classes (OBC). In East Sikkim 44 households out of 50 belong to ST category, the corresponding figure for South Sikkim is 68 percent. The OBC figure comprises to 12 percent to East Sikkim and 32 percent in South Sikkim respectively.

The Data

2.11 Both secondary as well as primary data is used in this study. The secondary information has been collected from the various levels of administrative machinery of the State including the records maintained at block, district and State levels.

Analytical Tools

2.12 In general, to make the analysis simple and more understandable, tabular analysis is used.

Reference Period

2.13 The reference period of the study will be 2015-16.

Limitations of the Study

2.14 There is apprehension that it will be difficult for the farmers to segregate the quantity and costs of farm inputs used in various farm operations in the protected and open cultivation. Due to non-availability of comparable time-series published data, information on several variables were supplemented with data collected from un-published sources too.

Chapter– III

Present Scenario of Poly House Development under MIDH in Sikkim

3.1 The Horticulture and Cash Crop Development Department was mandated for development of horticulture in the State. The Department mainly implemented (i) Horticulture Mission for North Eastern and Himalayan States, (ii) National bamboo Mission, (iii) National Mission for Micro Irrigation, and (iv) National Mission for Medicinal plants. Performance Audit for the period 2010-15 disclosed that the Department had achieved the target in full except during 2014-15. In overall terms, area under cultivation, production and productivity of various crops registered marginal improvement. The Department had to its credit a number of success stories in establishing the livelihood of some of the farmers in floriculture, vegetable, etc. paving way for economic uplift of the farmers. The beneficiary survey of the farmers disclosed that the farmers were satisfied by the support and assistance extended by the Department. The farmers however, were dependent upon the Department for continuance in farming. Programme implementation of Horticulture Mission for North East and Himalayan States (HMNEH) revealed that three Centers of Excellences (COEs), with the objective to grow more from less areas, were established in farmers' field instead of being set up on Government farm as envisaged. The Department had neither maintained details of seedling grown and supplied by each of the nurseries nor initiated adequate measures to ensure end to end approach, especially post-harvest management to enable the farmers to sell their produce. Audit Report for the year ended 31 March, 2015 mentioned that 30 Integrated Floriculture Pack House constructed at a cost of Rs.1.52 crore in May 2008 which was not yielding value for money towards the project objective of collecting, sorting, grading, preserving, weighing and packing cut flowers for export. In the process, the Department had initiated steps to strengthen existing horticulture infrastructure, availability of inputs and technological know-how to the farmers.

3.2 Cost Norms and Pattern of Assistance for Polyhouses in Sikkimis depicted in Table-3.1. From the above table it is found that regarding green house structure , in case of fan and pad system, total number given by the Horticulture Department till

2015-16 was nil. But in case of Naturally ventilated system – Tubular Structure - 419000 Sq. m. where maximum permissible cost Rs.1219 per sq,m, and Bamboo Structure-97800 sq.m, where maximum permissible cost Rs.518 per sq,m, was given.

Table 3.1. Cost Norms and Pattern of Assistance for Poly Houses in Sikkim

Particulars	Total No. given Till 2015-16	Maximum permissible cost	Pattern of assistance
Green House Structure			
Fan and pad system	NA	NA	NA
Naturally ventilated system			
Tubular Structure	419000 Sq.m	Rs.1219 /Sq.m	50%
Wooden Structure			
Bamboo Structure	97800 Sq.m	Rs.518 /Sq.m	50%
Shade Net House			
Tubular Structure	-	-	-
Wooden Structure	-	-	-
Bamboo Structure	62000 Sq.m	Rs.414 /Sq.m	50%
Plastic Tunnels	63000 Sq.m	Rs.75 /Sq.m	50%
Walk in Tunnels	7200 Sq.m	Rs.600 /Sq.m	50%
Anti Bird/Anti Hail Nets	134000 Sq.m	Rs.35 /Sq.m	50%
Cost of planting material & cultivation of high value vegetables grown in polyhouse	NA	NA	NA
Cost of planting material & cultivation of Orchid and Anthurium under polyhouse /shade net house	NA	NA	NA
Cost of planting material & cultivation of Rose and Lilum under polyhouse /shade net house	NA	NA	NA
Plastic Mulching	575 ha	Rs.36800 /ha	50%

Source: Directorate of Horticulture, Government of Sikkim.

In case of Shade Net House Bamboo Structure (62000 sq. m), where maximum permissible cost Rs.414 per sq m. In case of Plastic Tunnels- 63000 Sq. m. where maximum permissible cost Rs.75 per sq,m,in case of Walk in Tunnels -7200 Sq. m., where maximum permissible cost Rs.600 per sq,m, in case of, Anti Bird/Anti Hail Nets -134000 Sq. m., where maximum permissible cost Rs.35 per sq,m and in case of Plastic Mulching -575 ha, where maximum permissible cost Rs.36800 per ha , was given by the Horticulture Department till 2015-16 . In all the cases, the pattern of assistance was 50%.

3.3 The Department undertook various activities under different schemes to expand the area under coverage, enhance production and improve upon productivity.

3.4 The budgetary allocation and expenditure there against during 2010-15 was as under: Programme management plays an important role in achieving overall objectives of the Department. During 2010-15, HCCDD implemented four major schemes, which included Horticulture Mission for North East and Himalayan States (HMNEH), National Bamboo Mission (NBM), National Mission for Medicinal Plants (NMMP) and National Mission for Micro-Irrigation (NMMI). The impact of these schemes w.r.t. area under production and productivity for the period for various crops are given below:

It was noticed that area under production increased marginally but steadily from 12.89 to 17.59 hectares (36 per cent) for fruits, from 14.40 to 15.17 hectares (5 per cent) for vegetables, 10.11 to 10.95 hectares (8 per cent) for Root and Tubers17 (R&T) and 24.38 to 28.32 hectares (16 per cent) for spices during 2010-15. In case of flowers, area under production increased by 0.022 hectares (24 per cent) from 0.089 to 0.111 hectares during the same period. In case of flowers, production increased by 20.46 lakh numbers (18 per cent) from 114.08 to 134.54 lakh numbers during the same period. The productivity increased 109 kg/ha (2 per cent) from 5,220 to 5,329 kg/ha for vegetables, 27 kg/ha (1 per cent) 4,862 to 4,889 kg/ha hectare for R&T, 24 kg/ha (1 per cent) from 2,148 to 2,172 kg/ha for spices and 40 kg/ha (1 per cent) from 3,089 kg/ha to 3,129 kg/ha for fruits during 2010-15. Horticulture Mission for North East and Himalayan States This HMNEH is the back bone of horticulture development initiatives in the State. Target and achievement of major components under HMNEH for the State for 2010-15 is like this: It was noticed that the targets were fully achieved under various components of the HMNEH during 2010-14. During 2014-15, while achievement (16,951 ha) under organic farming was higher than the target (7,809 ha); there were shortfalls in production of planting materials, area expansion in case of flowers and fruits, rejuvenation/replacement of senile plantation, protected cultivation and horticulture mechanization. The SFAC Sikkim took up execution of three Centres of Excellence (CoE) in Horticulture in South, West

and East districts at a cost of ` 5 crore each (total ` 15 crore) fully funded by GOI with the primary goal of growing more from less area. The major component of the CoE included establishment of mother block of improved varieties of fruit, flower and vegetable in open field conditions, rootstock block of citrus and apple (under open conditions), high-tech green houses, naturally ventilated green houses, net houses, low tunnel poly houses, various types of irrigation facilities, support systems for fruits grown in vines/climbers, vermin compost/farm yard manure unit, tissue culture units, training centre, etc. we observed that the programme was implemented by the Department in individual farmers' fields like any other area expansion programme for fruits, vegetables, etc. through construction of green houses, distribution of seeds, seedlings, manure, etc. for taking up plantation by farmers. The guidelines envisaged that independent CoEs fully under the control of the Department ought to be established. This was obviously to provide access and demonstration to all farmers which would become restricted when such centres come up on private land. Green House constructed in farmers' field at West District Activities like cultivation of local vegetable/drum stick were taken up by farmers, which was easily available locally and did not contribute towards establishing or even introduce improved varieties.

3.5 Mother block of improved variety of tomatoes, capsicum and cucumber was established. Hi-tech green house with fitted with cooling, misting heating system alongwith humidity and temperature control system and raised platform were constructed. Tubular structure green houses were constructed in the farmers' field instead of high tech green houses. Automation fertigation/irrigation unit established. Overhead sprinkling and fogging system installed for Fertigation. Tissue culture unit Established. Training Centre established and training to the farmers were provided. 2 (out of 3) centres were taken up but not completed as of March 2015. Thus, the CoE, which was intended to grow more from less area by establishment of mother block of improved variety and other associated facilities was not achieved despite incurring ` 13.93 crore by the Department. The Department took up construction of Integrated Floriculture Pack House (IFPH) for fresh cut flowers, flower bulbs and allied products at Rangpo and Melli at a total project cost

of ` 299.30 lakh under the financial assistance (` 280 lakh) of Agriculture and Processed Food Export Development Authority (APEDA). The project was taken up with the objective of collecting, sorting, grading, packing, preservation and export of cut flowers to earn maximum foreign exchange. The project was split in two phases: Phase-I envisaged establishment of Rangpo Pack House at ` 151.90 lakh and Phase-II envisaged establishment of Melli Pack House and two cold storages at ` 147.40 lakh. The construction of project commenced in August 2007 through contractor and was completed in May 2008 at a cost of ` 151.90 lakh. The project was handed over only in April 2011 to SIMFED for operation. However, the project was returned back (May 2012) by SIMFED as they could not use the facility for reasons not on record. The Department while agreeing that the facility could not be used by SIMFED stated that the same was likely to be handed over to Sikkim Rural Development Agency (SRDA). Thus, the project completed at a cost of ` 151.90 lakh was rendered unfruitful as of October 2015 and the project objective of collecting, sorting, grading, packing, preservation and export of cut flowers to earn maximum foreign exchange were not achieved. Phase-II of the IFPH project proposed to be established at Melli at a cost of ` 147.40 lakh was substantially revised (June 2010) to ` 384.03 lakh. The civil construction part of the project was completed to the extent of 90 per cent by incurring ` 2.17 crore as of August 2015. However, installation of machinery and equipment was awaited due to want of funds. The Department had invited expression of interest for leasing out the facility at Melli. However, as of October 2015, value for money was not obtained from the facility and it remained idle despite incurring an expenditure of ` 2.17 crore. Inordinate delay in establishment of Modern Flower Electronic Auction Centre and Pack House The Department decided (August 2012) to set up a Modern Flower Electronic Auction Centre and Pack House in the upcoming Airport at Pakyong with the objective of export of floriculture products.

3.6 Protected cultivation HMNEH guidelines envisaged promotion of activities like construction of shade net house, green houses, mulching and plastic tunnels, anti-bird / hail nets to increase the productivity. State Horticulture Mission constructed a number of structures in the farmers field at an aggregated cost of ` 65.64 crore during 2010-15. Audit observed during beneficiary survey that the structures were put to

use by the farmers and the farmers regarded the structure very useful in improving the productivity thereby supplementing their income. The State Horticulture Mission, however, had neither collected the production particulars from the beneficiaries to establish that there was proper utilisation of subsidy and increase in production and productivity after implementation nor realised 50 per cent beneficiary contribution of ` 32.82 crore as envisaged in the guidelines. The Department stated that farmers contribution was not taken in financial terms but they had contributed towards land leveling including stone walls, arrangement of required organic manure, water for irrigation, labour for cultivation, etc. The guidelines however, mandated for 50 per cent cost recovery from farmers which was not effected by the Department. The NEC, Ministry of Development of North Eastern Region, GOI sanctioned (December 2012) a project 'Cultivation of Commercial Floriculture Crops, Rumtek, East Sikkim' at a cost of ` 3.83 crore on cost sharing of 90:10 between GOI and State Government and simultaneously released (December 2012) ` 1.20 crore towards first installment. Economic Sector 47 project comprised of infrastructures like green houses, stores, irrigation systems, planting materials in 2.75 acres of land, with a view to promote production of anthurium, lilium and orchids under green house.

3.7 Thus the present scenario of Poly house development under MIDH in Sikkim can be described in such a manner in which we can see that The Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in all the districts of the state thereby covering important horticulture crops.

Progress till 2014-15

Salient physical progress 2014-15 is as follows:-

- An additional area of 78204 ha of identified horticulture crops have been covered.
- In all, 157 nurseries have been established for production of quality planting material.

- An area of 2700 ha has been covered under rejuvenation of old and senile orchards.
- Setting up of 4 IPM/INM infrastructure facilities such as Leaf tissue analysis labs, disease forecasting units.
- Organic farming has been adopted in an area of 35418 ha for promotion of organic cultivation of horticultural crops. Besides, 997 vermi compost units have been set up.
- An area of 415.96 ha has been covered under protected cultivation.
- 48835 farmers have been trained under various horticulture activities.
- Establishment of 3 Centers of Excellence (CoEs) has been reported.

An amount of Rs. 373.47 crore was released to the State till 2014-15 and the State Government has reported an expenditure of 328.97 crore.

Progress during 2014-15

- An outlay of Rs. 49.00 crore has been approved for the State to implement HMNEH related activities of NHM during 2014-15. Funds to the tune of Rs. 44.50 crore have been released. An expenditure of Rs. 0.60 crore has been reported.
- Outlay of Rs. 0.19 crore earmarked for PHM and Market during 2014-15. In this regard, progress is awaited.

Programme during 2015-16

An outlay of Rs. 69.00 crore including GOI share of Rs. 34.50 crore (50% of total outlay) has been earmarked for Sikkim during 2015-16. Funds to the tune of Rs. 17.25 crore have been released. (**Source : www.midh.gov.in)**

Chapter– IV

Socio-Economic Features of Poly House Owners in the State

4.1 It is not mere the invention but innovation and adoption of modern techniques of cultivation entirely depends upon the socio-psychological factors of the region where the new innovative measures are being meant to be introduced. It is often told that innovation of modern techniques and scientific method of farming to a significant extent depends upon the economic viability of the farmers. Simultaneously, to break the inertia of long running rituals and traditional wisdom and custom to a newer innovative way for betterment of livelihood depends upon the socio-psychological factors and receptive acumen of the demographic characteristics of the people of that particular region too. Intelligence level, grade of education and economic bases of the farmers play a key role in understanding and implementing the modern technique of cultivation for making the process a success for their economic sustenance.

4.2 Demographic features of the respondents have been depicted in the table-4.1 to 4.8, where besides family composition, level of education, occupational status, and other important information like land resources have been studied and analyzed in greater details. As far as categorization of farmers among marginal, small, medium and large is concerned, (as there are no marginal, medium and large farmers) we have classified those farmers as small farmers who deals with the poly houses ranging between 100 mts^2 to 200 mts^2 in size of operation.

Table 4.1. Average Family Size of Sampled Households

Family Size	Category			
	Small	**Medium**	**Large**	**All**
No. of persons	421 (4.21)	-	-	421 (4.21)

Source: Field Survey *Figures in the parentheses indicate average family size*

4.3 Average family size of the small farmers is 4.21 and it seems is moderate in size.

4.4 Educational standard of the respondents satisfactorily are very rich. Literary level among small farmers goes to the tune of 96 per cent, where 18.5 per cent of the respondents completed education up to graduation or above graduation level. Over

75 per cent of the respondent farmers in this class have completed primary, upper primary and secondary level of education.

Table 4.2. Educational Level of Family Members of Sampled Households

(Percentages)

Particulars	Category			
	Small	Medium	Large	All
Illiterate	5.7	-	-	5.7
Primary	24.9	-	-	24.9
Middle	25.2	-	-	25.2
Secondary	25.7	-	-	25.7
Graduates	16.4	-	-	16.4
Above graduation	2.1	-	-	2.1
Total	100.0	-	-	100.0

Source: Field Survey

Table 4.3. Occupational Pattern of Sampled Households (Main Occupation)

(No.)

Particulars	Category			
	Small	Medium	Large	All
Self Farming	236 (56.1)	-	-	236 (56.1)
Self Employed Non-farming	33 (7.8)	-	-	33 (7.8)
Salaried	22 (5.2)	-	-	22 (5.2)
Agricultural Labour	0 (0.0)	-	-	0 (0.0)
Non-agricultural Labour	0 (0.0)	-	-	0 (0.0)
Retired Pensioner	0 (0.0)	-	-	0 (0.0)
Dependent	0 (0.0)	-	-	0 (0.0)
Household Work	51 (12.1)	-	-	51 (12.1)
Student	78 (18.5)	-	-	78 (18.5)
Others	1 (0.2)	-	-	1 (0.2)
Total Population	421 (100.0)	-	-	421 (100.0)

Source: Field Survey ***Note.*** *Figures in parentheses denote the percentages.*

4.5 Main occupational pattern of sampled households show that almost 56 per cent of the small farmers belong to self farming category. Amongst them the percentage figure in self employed non-farming category is 7.8 percent and 5.2 percent of them belongs to salaried class. Almost 12 per cent of the small farmers are engaged in household activities.

4.6 The subsidiary occupational pattern of the sampled households gives fairly an interesting picture. Information derived from Table-4.4 taking all categories (in this case only small farmers) together almost 79 per cent of the households associated with self-employed non-farming activities. Among small farmers, almost 12 per cent of the households are engaged in self-farming. In case of engagement as

agricultural and non-agricultural labour the corresponding figures for both of the cases are same.

Table 4.4. Occupational Pattern of Sampled Households (Subsidiary Occupation)

(No.)

Particulars	Category			
	Small	Medium	Large	All
Self Farming	23 (12.1)	-	-	23 (12.1)
Self Employed Non-farming	150 (78.9)	-	-	150 (78.9)
Salaried	0 (0.0)	-	-	0 (0.0)
Agricultural Labour	7 (3.7)	-	-	7 (3.7)
Non-agricultural Labour	7 (3.7)	-	-	7 (3.7)
Retired Pensioner	0 (0.0)	-	-	0 (0.0)
Dependent	0 (0.0)	-	-	0 (0.0)
Household Work	3 (1.9)	-	-	3 (1.9)
Student	0 (0.0)	-	-	0 (0.0)
Others	0 (0.0)	-	-	0 (0.0)
Total Population	190 (100.0)	-	-	190 (100.0)

Source: Field Survey *Note. Figures in parentheses denote the percentages*

Table 4.5. Land Resources of Selected Protected Cultivators

(Ha/Farm)

Particulars	Category			
	Small	Medium	Large	All
1.Total land owned	1.06	-	-	1.06
a. Cultivated land	1.05	-	-	1.05
- Irrigated	0.40	-	-	0.40
- Un-Irrigated	0.65	-	-	0.65
b. Cultivable waste	0.03	-	-	0.03
c. Non cultivable	0.00	-	-	0.00
2. Leased in land	0.11	-	-	0.11
- Irrigated	0.02	-	-	0.02
- Un-Irrigated	0.10	-	-	0.10
3. Leased out land	0.01	-	-	0.01
- Irrigated	0.01	-	-	0.01
- Un-Irrigated	0.00	-	-	0.00
4. Net operated area	1.05	-	-	1.05
- Irrigated	0.40	-	-	0.40
- Un-Irrigated	0.65	-	-	0.65

Source: Field Survey

4.7 Information relating to land resources of selected protected cultivation is given in Table-4.5 and 4.6, wherein we find in case of land ownership status the small farmers are marginally ahead of the marginal farmers as per the usual norms and traditional classification of farmers. Net operated area within this size class is 1.05 Ha. Out of

total cultivated land only 38 per cent are irrigated; the figure remains almost same if one considers percentage of irrigated area in terms of net operated area.

Table 4.6. Land Resources of Selected Protected Cultivators

(Percentages)

Particulars	Category			
	Small	Medium	Large	All
1. Total land owned	100.0	-	-	100.0
a. Cultivated land	98.9	-	-	98.9
- Irrigated	37.9	-	-	37.9
- Un-Irrigated	61.0	-	-	61.0
b. Cultivable waste	3.0	-	-	3.0
c. Non-cultivable	0.0	-	-	0.0

Source: Field Survey

Table 4.7. Per Farm Annual Income from Other Sources

(Rs.)

Source of Income	Category			
	Small	Medium	Large	All
Animal husbandry	3706.00	-	-	3706.00
Income from salary	19780.00	-	-	19780.00
Business	3470.00	-	-	3470.00
Income from wages	0.00	-	-	0.00
Pension	0.00	-	-	0.00
Other	688.00	-	-	688.00
Total income	27644.00	-	-	27644.00

Source: Field Survey

Table 4.8. Per Farm Annual Income from Other Sources

(Percentages)

Source of Income	Category			
	Small	Medium	Large	All
Animal husbandry	13.4	-	-	13.4
Income from salary	71.6	-	-	71.6
Business	12.6	-	-	12.6
Income from wages	0.0	-	-	0.0
Pension	0.0	-	-	0.0
Other	2.5	-	-	2.5
Total income	100.0	-	-	100.0

Source: Field Survey

4.8 Annual income from other than agricultural sources of the sampled households has been depicted in the Table-4.7 and 4.8. It appears from these two tables that per farm annual income other than agricultural sources of this size class of farmers in

different components, their share and contribution vary from one profession to other. As far as income from salaried component is concerned, it contributes almost 70 percent of total income Animal Husbandry also contributes a significant portion of non-agricultural income for this class of farmers. The corresponding figure for this segment is 13.4 per cent. Besides salary and animal husbandry, percentage share of income through business activities is 12.6 respectively.

Chapter- V

Motivations/Hindrances and Costs Involved in Poly House Construction

5.1 The scheme entitled "Mission for Integrated Development of Horticulture" was introduced during 12th Plan period considering the holistic development approach in the state. For effective implementation of the scheme a continuous and well-concerted move stating from the government level to the implementing agencies including the farmers are well solicited. The guiding principles in its effective execution solely depend upon the motivational factors of the people and removing the hindrances are being faced in different segments of implementation of this scheme. The hindrances may be attributed as institutional or technical or financial but whatever it may be facilitating the scheme through dealing with these obstacles in various forms should be the ultimate object for reaping the benefits arising out the effective implementation for much talked holistic development for all corners.

5.2 It is seen from the Table-5.1 that the existing poly-houses in our survey area are simple, and cultivation being held as single-tier basis. No multi-tier cultivation is visible in this area.

5.3 Dissemination of ideas and sharing of experiences play an important role in accepting cultivation in such a new-fashioned method. It is seen from the Table-5.2 that all of the farmers took information from the horticultural development, 32 per cent of them got information from the friends and relatives and 36 per cent of the farmers motivated from the awareness camps. Awareness camps played an important role in demonstrating the ideas though reporting or disseminating of news of TV / Radio / Newspapers hardly played a key role in accepting this scheme.

5.4 For innovating any new ideas farmers are generally get interested to know about the nifty gritty of the scheme like, availability of subsidies, technical know-how and other detailing. From Table-5.3 we find the Horticulture Department in the state of Sikkim played a crucial role in motivating the farmers for adopting the scheme. Almost in all of the cases, the farmers unanimously reported that they got ample

information from the said Department as well as help and cooperation for introducing the same.

5.5 There are various guiding forces for motivating the farmers for adopting poly-houses for horticultural production. Time immemorial, Sikkimese people are accustomed in cultivating horticultural crops and the cultivation was done mainly for the home consumption only. It is reported that a continuous efforts of the Government Officials along with an enterprising zeal for commercial production of horticultural crops play a role behind this motivation. Possibility of higher income through commercialization of their products and an easy access of technology further added a fuel in that motivation. Besides all, availability of subsidy in monetary form induced them a lot. (Table-5.4)

Table 5.1. Type of Poly Houses

(No.)

Type	Small	Medium	Large	All
Simple	100	-	-	100
Hi. Tech.	0	-	-	0
• Single Tier Cultivation	100	-	-	100
• Multi Tier Cultivation	0	-	-	0

Source: Field Survey

Table 5.2. Sources of Information about Poly House

(Multiple Responses in %)

Sources	Category			All
	Small	Medium	Large	
Horticulture Department	100.0	-	-	100.0
Friends / relatives	32.0	-	-	32.0
Seen in other villages	0.0	-	-	0.0
Awareness camps	36.0	-	-	36.0
Radio / News Paper etc.	0.0	-	-	0.0

Source: Field Survey

Table 5.3. Sources of Information About Scheme/Subsidy/Technical Details

(Multiple Responses in %)

Sources	Category			All
	Small	Medium	Large	
Horticulture department	100.0	-	-	100.0
Friends / relatives	0.0	-	-	0.0
Seen in other villages	0.0	-	-	0.0
Awareness camps	0.0	-	-	0.0
Radio / News Paper etc.	0.0	-	-	0.0

Source: Field Survey

Table 5.4. Motivation Factors for Adoption of Poly House

(Multiple Responses in %)

Sources	Category			All
	Small	Medium	Large	
Low amount of land	27.0	-	-	27.0
Suitable land is available	0.0	-	-	0.0
Availability of manpower	0.0	-	-	0.0
Possibility of high income	59.0	-	-	59.0
Availability of subsidy	57.0	-	-	57.0
Availability of easy loan	0.0	-	-	0.0
Long crop duration	0.0	-	-	0.0
Easy control of insects / pests	0.0	-	-	0.0
Ready market for products	0.0	-	-	0.0
New crops can be grown	0.0	-	-	0.0
Enough financial resources	0.0	-	-	0.0
Availability of technology	24.0	-	-	24.0
Demonstration effect	0.0	-	-	0.0
Low availability of water for irrigation	0.0	-	-	0.0

Source: Field Survey

Table 5.5. Hindrances Encountered for Adoption of Poly House

(Multiple Responses in %)

Hindrances	Category			All
	Small	Medium	Large	
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
Unsuitable farm location	0.0	-	-	0.0
Marketing problems of crops	0.0	-	-	0.0
Took time to adjust new crops growing technology	48.0	-	-	48.0

Source: Field Survey

Table 5.6. Supervision of Polyhouse Construction by Officials

(%)

Particulars	Categories			All
	Small	Medium	Large	
Cases supervised	100.0	-	-	100.0
Attitude of Officials				
-Supportive	56.0	-	-	56.0
-Neutral	44.0	-	-	44.0
-Discouraging	0.0	-	-	0.0

Source: Field Survey

5.6 Besides motivational factors, removing the hindrances in an efficient manner play a crucial role in effective execution of any policy matter and fulfilling its basic objectives. In this case, various hindrances are classified as clearance from department, delays in technology transfer, long wait for loan clearance or subsidy, availability of construction materials, cost of construction, unavailability of skilled labour, marketing problem etc. Table-5.5 reveals that apart from all consideration the delayed process by the contractor in building up the poly-houses affect them most. It has been already stated that in Sikkim the government nominated contractors under an effective supervision of the government officials is constructing all poly-houses allotted to the farmers. In this case, the farmers in the study area consider procrastinated approach or the method as the most hindrance factor.

5.7 Besides the contractor's role, a long gestation period from vegetative growth to harvesting initially makes the farmers slightly unrest. The farmers ponder it a hindrance, but generally adjustment with the new growing technology needs time. Hopefully with an effective extension programme this hindrance could be removed shortly.

5.8 Extension activities by the government officials in poly-house construction in this sampled area play a crucial role. It was reported that almost in all cases (here 100 per cent of cases) the government officials were supervising the poly-houses in the sampled area. In 56 per cent of the cases, they took a supportive role. It is reported that only in 44 per cent of cases their attitude was neutral. (Table5.6)

5.9 Suggestions of and from the grass-root level farmers are essential for its effective utilization of poly-house cultivation and for the successful implementation of the MIDH Scheme in this state. Multiple responses at this end are received from the respondents for improvement of the poly-houses in the study area. From the responses, it is derived from Table-5.7 that organic farming with more technological know-how could make a dent in horticultural production in this State. 68 per cent of them have responded for change or modification of existing cropping practices while 16 per cent opined for better supply procedure or emphasized on availability of inputs in a more convenient way.

Table 5.7. Suggestions for Improvement of Poly Houses

(%)

Particulars	Categories			All
	Small	Medium	Large	
Farmers with suggestions	80.0	-	-	80.0
Suggestions (Multiple Responses in %)				
Adaptation of design to local conditions	0.0	-	-	0.0
Cost saving measures	0.0	-	-	0.0
Crops to be grown	0.0	-	-	0.0
Cropping practices	68.0	-	-	68.0
Sources of inputs	16.0	-	-	16.0
Organic farming	56.0	-	-	56.0
Product processing and packing	0.0	-	-	0.0
Storage techniques	100.0	-	-	100.0
Marketing assistance	0.0	-	-	0.0

Source: Field Survey

5.10 Storing of harvested vendible commodities seen to be a problem of all of them, and they unanimously advocated for better storage technique. It is important in the sense, starting from harvesting to marketing it took a longer period and hence in order to keep the product fresh and clean, a better technique of storage is highly solicited.

Table 5.8. Delays in No Objection Certificates (NOC)

(%)

Particulars	Categories			All
	Small	Medium	Large	
Farmers reporting delay	0.0	-	-	0.0
Farmers reporting No delay	100.0	-	-	100.0

Source: Field Survey

5.11 In case of other suggestions viz. availing of no objection certificate (NOC) for the plucked flowers or harvested vegetables seems to be an important point to be noted. NOC is required for exporting these harvested commodities through APEDA or other exporting agencies, and delaying the process might cause harm to the farmers

of the product. No delaying in availing of the NOC plays a positive contributing factor in helping the cultivation in protected condition. (Table5.8)

Table 5.9. Equipments Installed in Poly Houses

(% of farmers)

Equipments installed	Categories			All
	Small	Medium	Large	
Heater	0.0	-	-	0.0
Cooler	0.0	-	-	0.0
Humidifier	0.0	-	-	0.0
Sun shade	100.0	-	-	100.0
Drip irrigation	60.0	-	-	60.0
Fogger	0.0	-	-	0.0
Water tank	79.0	-	-	79.0
Vermi-compost pit	52.0	-	-	52.0

Source: Field Survey

5.12 Horticultural crop cultivation in poly-houses needs more technical and scientific appliances for it's fully utilization of capacity enabling the inner atmosphere more congenial for producing the same. Table-5.9 revels that many of the technical equipments like heater, cooler, humidifier, and fogger are quite absent in all of the poly-houses. Only 60 per cent of them are provided with drip irrigation facilities, almost 80 per cent of them have built near farm and 52 per cent have built vermin-compost pits. Availability of other equipments could enhance production and method of cultivation more scientifically to a greater extent.

5.13 No response is received for the reasons for deviation from the recommended design of poly-houses. It was reported earlier that almost all cases, unlike other states the size of poly-houses in this state's ranges between 100 mt^2 to 200 mt^2 , and as per the study format they all have fallen in the small farmers category.

5.14 Imparting training and dissemination of ideas and experiences could play a crucial role in motivating farmers adopting horticulture crops through protected condition. As all we know, demonstration effect in agricultural sector has an important role to contribute and in this case also sharing of ideas and experiences from the government officials and also from the neighboring farmers play a crucial role in adopting protected cultivation through poly-house operation method. It is

reported that 60 per cent of the farmers received training from the government sources and a multiple responses yield 39 per cent of them are benefitted from the nearby Krishi Vigyan Kendra (KVK). It is expected that KVKs would take more active role in disseminating new ideas and technical know-how to the farmers for a better operation and functioning of the existing poly-houses in the study area.

Table 5.10. Sources of Training/Dissemination Provided to Farmers for Protected Cultivation

(Multiple Responses in %)

Sources	Categories			All
	Small	Medium	Large	
1.State Horticulture Department	59.00	-	-	59.00
2.State Agricultural / Horticulture University	0.0	-	-	0.0
3.Krishi Vigyan Kendras	39.0	-	-	39.0
4.Kisan Call Centre	0.0	-	-	0.0
5.Cooperatives / Local Bodies	0.0	-	-	0.0
6.Input Dealers / Private Company	0.0	-	-	0.0
7.Spcial Research Stations set up by the	0.0	-	-	0.0
8.Non Government Organisations (NGOs)	0.0	-	-	0.0
9. Any Other	0.0	-	-	0.0

Source: Field Survey

5.15 The information regarding cost of construction of poly house structures & other equipments were not available as these are sponsored by the State Government in Sikkim and hence farmers did not avail any loan for construction of poly houses.

Chapter-VI

Costs and Returns from Protected Crops

6.1 Cost of cultivation plays an important role in gainful economic activities like production of horticultural crops in protected condition. A number of activities are classified and the cost involved in each and every phase of production of Carnation has been worked out.

6.2 It is seen from the table-6.1(a) that value of sapling alone eats up the major chunk of costs involved in carnation production only. From the cultivation it is found almost 87 per cent of the total costs are spent for purchasing sapling for producing carnation flower followed by costs of insecticides/pesticides, formation of beds and for application of fertilizer.

Table 6.1.(a) Cost of Cultivation of Carnation Under Protected Condition

(Rs. /polyhouse)

Cost items	Category				
	Small	Medium	Large	All	
				Rs.	%
Formation of beds	872.00	-	-	872.00	3.0
Value of sapling	25548.72	-	-	25548.72	87.0
Sowing/ Transplanting	168.00	-	-	168.00	0.6
Manuring/FYM	215.19	-	-	215.19	0.7
Vermicompost	0.00	-	-	0.00	0.0
Fertilizer	812.96	-	-	812.96	2.8
Insecticides/pesticides	1065.92	-	-	1065.92	3.6
Interculture	52.00	-	-	52.00	0.2
Irrigation	220.04	-	-	220.04	0.7
Spraying	0.00	-	-	0.00	0.0
Stalking etc.	0.00	-	-	0.00	0.0
Harvesting/ picking	260.00	-	-	260.00	0.9
Miscellaneous Cost	140.00	-	-	140.00	0.5
Total production cost	29354.83	-	-	29354.83	100.0

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

6.3 It is worth mentioning that Sikkim is fully an organic state and hence insecticides/pesticides means organic or bio-insecticides and pesticides. Application of fertilizer emphasized an application of bio-fertilizer only. Cost of cultivation for these three components is higher in case of small farmers. Existence of medium and large category of farmers are quite absent in our study region.

Table 6.1.(b) Cost of Cultivation of Jarbera Under Protected Condition

(Rs. /polyhouse)

Cost items	Category				
	Small	Medium	Large	All	
				Rs.	%
Formation of beds	1060.00	-	-	1060.00	2.3
Value of sapling	42161.40	-	-	42161.40	89.7
Sowing/ Transplanting	74.40	-	-	74.40	0.2
Manuring/FYM	216.37	-	-	216.37	0.5
Vermicompost	0.00	-	-	0.00	0.0
Fertilizer	789.60	-	-	789.60	1.7
Insecticides/pesticides	2035.14	-	-	2035.14	4.3
Interculture	52.00	-	-	52.00	0.1
Irrigation	231.48	-	-	231.48	0.5
Spraying	0.00	-	-	0.00	0.0
Stalking etc.	0.00	-	-	0.00	0.0
Harvesting/ picking	256.00	-	-	256.00	0.5
Miscellaneous Cost	132.00	-	-	132.00	0.3
Total production cost	47008.39	-	-	47008.39	100.0

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

6.4 In case of Jarbera cultivation these three components possesses the maximum share of costs and almost 96 per cent of the total cost are spent for these three items. Jarbera too resembles Carnation in terms of cost of purchasing sapling and in percentage terms, it is much higher in comparison to the small farmers in this case only. Use of bio-pesticides or insecticides is marginally higher for the farmers. It is seen from Table-6.1(b) that barring sowing/transplanting and inter-culture of crops, cost of cultivation for almost all components is lower than the small farmers in carnation production.

Table 6.2.(a) Net Returns From Cultivation of Carnation Under Protected Condition

(Rs. / polyhouse)

Cost items	Category			
	Small	Medium	Large	All
Production cost	29354.83 (35.87)	-	-	29354.83 (35.87)
Marketing cost	6487.60 (7.93)	-	-	6487.60 (7.93)
Total cost	35842.43 (43.79)	-	-	35842.43 (43.79)
Value of output*	81846.76 (100.00)	-	-	81846.76 (100.00)
Net returns	46004.32 (56.21)	-	-	46004.32 (56.21)

*Source: Field Survey, * value of total quantity marketed excluding loss*
Figures in parenthesis indicate percentages

6.5 Returns of cultivation of both Carnation and Jarbera yield fairly an interesting picture. It reveals from Table-6.2(a) and Table-6.2(b) though total cost for cultivating Jarbera under protected condition is significantly higher in comparison to cultivation of Carnation. In percentage term the figure of total cost of Jarbera over value of output reflects 57.74 where as in case of Carnation, it is 43.79 only. Ostensibly, net returns of these two flowers are directly influenced by the quantum of cost of cultivation. In this case in terms of net returns Carnation has marginally edge over Jarbera as cost of cultivation for the later is higher

6.6 Unlike floriculture, cost of cultivation for vegetable production under protected contribution (in this case Capsicum and Tomato) has shown at least some contributing figures in its various components starting from inter-culture, harvesting / picking, seed / seedling and formation of bed operation respectively.

Table 6.2.(b)Net Returns From Cultivation of Jarbera Under Protected Condition

(Rs. / polyhouse)

Cost items	Category			
	Small	Medium	Large	All
Production cost	47008.39 (50.08)	-	-	47008.39 (50.08)
Marketing cost	7189.60 (7.66)	-	-	7189.60 (7.66)
Total cost	54197.99 (57.74)	-	-	54197.99 (57.74)
Value of output*	93869.81 (100.00)	-	-	93869.81 (100.00)
Net returns	39671.82 (42.26)	-	-	39671.82 (42.26)

*Source: Field Survey, * value of total quantity marketed excluding loss*
Figures in parenthesis indicate percentages

Table 6.3.(a) Cost of Cultivation of Capsicum Under Protected Condition

(Rs. / polyhouse)

Cost items	Category				
	Small	Medium	Large	All	
				Cost	%
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
Miscellaneous Cost	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.*

6.7 Cost of harvesting or picking in case of tomato is fairly higher followed by inter-culture, purchasing seeds and formation of beds respectively. In case of Capsicum cost for these activities are somehow similar nature. Cost of harvesting for Tomato is almost 40 per cent of total cost where as 13.5 per cent of the cost is being used for inter-culture operation. The corresponding figure for Capsicum production is 31.6 per cent and 20.6 per cent respectively. Interestingly, in both of these two cases no bio-fertilizers or bio-pesticides or insecticides are used. Manuring and transplants cost in both of these cases share a significant position when treated collectively.

6.8 Net returns of crop Tomato and Capsicum under protected condition over its costs of production gives fairly an interesting picture. Table-6.4(a) and 6.4(b) show that net returns for small farmers in case of tomato is marginally lower than capsicum cultivation, and it is due to the fact total cost of production over value of output for tomato is higher than capsicum cultivation.

Table 6.3.(b) Cost of Cultivation of Tomato Under Protected Condition

(Rs. / polyhouse)

Cost items	Category				
	Small	Medium	Large	All	
				Cost	%
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
Miscellaneous Cost	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.*

Table 6.4.(a) Net Returns From Cultivation of Capsicum Under Protected Condition

(Rs. / polyhouse)

Cost items	Category			
	Small	Medium	Large	All (%)
Production cost	2484.30 (8.77)	-	-	2484.30 (8.77)
Marketing cost	2215.80 (7.82)	-	-	2215.80 (7.82)
Total cost	4700.10 (16.60)	-	-	4700.10 (16.60)
Value of output*	28319.14 (100.00)	-	-	28319.14 (100.00)
Net returns	23619.04 (83.40)	-	-	23619.04 (83.40)

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

Table 6.4.(b) Net Returns From Cultivation of Tomato Under Protected Condition

(Rs. / polyhouse)

Cost items	Category			
	Small	Medium	Large	All (%)
Production cost	2316.07 (10.96)	-	-	2316.07 (10.96)
Marketing cost	1649.88 (7.81)	-	-	1649.88 (7.81)
Total cost	3965.95 (18.77)	-	-	3965.95 (18.77)
Value of output*	21124.09 (100.00)	-	-	21124.09 (100.00)
Net returns	17158.14 (81.23)	-	-	17158.14 (81.23)

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

Table 6.5. Cropping Pattern on Sampled Farms (Unprotected Cultivation)

(Area in Ha/farm)

Crops	Category			All
	Marginal	Small	Medium	
Kharif crops				
Paddy	0.27	0.25	-	0.27
Maize	0.08	0.08	-	0.08
Cabbage	-	-	-	-
Tomato	-	-	-	-
Capsicum	-	-	-	-
Rabi crops				
Wheat	-	-	-	-
Peas	-	-	-	-
Cabbage	0.04	0.05	-	0.04
Cauliflower	0.05	0.06	-	0.05
Gross Cropped Area	0.44	0.44	-	0.44

*Source: Field Survey * Area size-classes are determined from net operated area of unprotected crops*

6.9 Cropping pattern of the sampled households in unprotected cultivation are shown in table-6.5. From this table we find crops paddy and maize are being sown in Kharif season and in Rabi season vegetables like cabbage and cauliflower are considered as significant crops being sown at this season. Barring paddy, cultivation of all crops inclusive two sowing season reflects small farmers have edge over the marginal farmers i.e. in terms of area/farm marginal farmers are lagging behind the small farmers in these study areas.

6.10 In case of cost of cultivation the marginal farmers have to bear higher cost in Maize, Cauliflower and Cabbage in comparison to small farmers. Only the small farmers have to spend more taking all components of cost of cultivation for paddy only. Again it is worthy to mention that application of fertilizers and insecticides denotes bio-fertilizers and bio-pesticides as the farmers have adopted organic farming as means of production.

Table 6.6. Cost of Cultivation of Unprotected Crops Grown on Marginal Farms

(Rs. / Ha.)

Cost items	Crops					
	Paddy	**Maize**	**Cauliflower**	**Cabbage**	**Peas**	**Beans**
Seed	598.23	750.58	13040.03	28543.50	-	-
Manure	1696.88	2269.45	17433.08	15800.88	-	-
Fertilizer	1575.55	1953.80	6599.50	7832.98	-	-
Insecticides & pesticides	1410.45	1703.20	1362.00	2161.50	-	-
Irrigation	2733.25	3290.93	4157.90	3355.45	-	-
Hired machinery	1769.50	1736.50	19151.00	7853.98	-	-
Hired animal labour	5578.85	6401.73	1153.20	4609.15	-	-
Hired labour	2853.85	4353.95	33904.88	16150.45	-	-
Family Labour	20363.73	24737.68	52046.18	70752.20	-	-
Other Cost	814.83	1063.05	4115.05	5328.18	-	-
Total cost	39395.08	48260.83	152962.80	162388.25	-	-

Source: Field Survey **Area size-classes are determined from net operated area of unprotected crops*

6.11 Table-6.6 and 6.7 reveal that in terms of labour absorption cost of higher labour for paddy, cauliflower and cabbage production is higher in small farmers group than marginal farmers. Only in case of maize cost for using higher labour among marginal farmers is higher than the small farming households.

6.12 Ostensibly, family labour absorption in case of marginal category of farmers is much higher than the small farmers. These two table show that except paddy cost for absorption of family labour in all crops is higher in marginal farmers than the small farmers in these study region.

6.13 Cost of cultivation of unprotected crops among all categories of farmers given in Table-6.8 yields a very interesting picture. It shows that inputted value of family labour in most of the causes bears the half of the total cost of production. As the opportunity cost of labour is almost zero, the family members are compelled to look after their farms and thus inputted value/cost of absorption of family labour is approaching to almost the half of the cost of production raising ample scope for providing an alternative viable gainful economic activity to all of them.

Table 6.7. Cost of Cultivation of Unprotected Crops Grown on Small Farms

(Rs. / Ha.)

Cost items	Crops					
	Paddy	Maize	Cauliflower	Cabbage	Peas	Beans
Seed	655.43	666.55	12511.18	26083.53	-	-
Manure	1845.18	2092.65	13715.40	13899.08	-	-
Fertilizer	1640.35	1695.10	6643.60	6888.83	-	-
Insecticides & pesticides	1560.25	1596.80	1355.08	1801.93	-	-
Irrigation	2785.55	2908.00	3968.20	3301.35	-	-
Hired machinery	1888.55	1531.90	19356.15	6376.98	-	-
Hired animal labour	6016.28	5634.28	1293.10	3639.95	-	-
Hired labour	3179.53	3991.10	36422.43	17720.10	-	-
Family Labour	21393.98	21798.95	49989.78	54650.13	-	-
Other Cost	840.35	916.18	4132.55	4204.30	-	-
Total	41805.43	42831.53	149387.43	138566.10	-	-

*Source: Field Survey * Area size-classes are determined from net operated area of unprotected crops*

Table 6.8. Cost of Cultivation of Unprotected Crops Grown on All Farms

(Rs. / Ha.)

Cost items	Crops					
	Paddy	Maize	Cauliflower	Cabbage	Peas	Beans
Seed	616.13	721.55	12860.65	27571.38	-	-
Manure	1743.33	2208.38	16172.13	15049.30	-	-
Fertilizer	1595.85	1864.43	6614.45	7459.85	-	-
Insecticides & pesticides	1457.35	1666.45	1359.65	2019.40	-	-
Irrigation	2749.63	3158.63	4093.58	3334.08	-	-
Hired machinery	1806.80	1665.80	19220.58	7270.30	-	-
Hired animal labour	5715.85	6136.60	1200.65	4226.13	-	-
Hired labour	2955.85	4228.60	34758.78	16770.75	-	-
Family Labour	20686.43	23722.45	51348.68	64388.95	-	-
Other Cost	822.83	1012.30	4120.98	4884.03	-	-
Total	40150.03	46385.20	151750.10	152974.15	-	-

*Source: Field Survey *Area size-classes are determined from net operated area of unprotected crops*

6.14 From the various components of cost of cultivation it is seen from the Table that costs of seeds per unit of land for cabbage cultivation is much higher in comparison to other crops. But, in case of application of manure and application of machineries, cost of cultivation for cauliflower is higher in comparison to other crops.

Table 6.9. Productivity of Crops on Sampled Farms (Unprotected Cultivation)

(Quintals / Ha.)

Crops	Category			All
	Marginal	Small	Medium	
Kharif crops				
Paddy	32.443	33.305	-	32.728
Maize	53.805	55.500	-	54.363
Cabbage	-	-	-	-
Tomato	-	-	-	-
Capsicum	-	-	-	-
Rabi crops				
Wheat	-	-	-	-
Peas	-	-	-	-
Cabbage	221.948	210.380	-	218.130
Cauliflower	235.848	237.663	-	236.448

Source: Field Survey *Area size-classes are determined from net operated area of unprotected crops*

Table 6.10. Production of Crops on Sampled Farms (Unprotected Cultivation)

(Quintals / farm)

Crops	Category			All
	Marginal	Small	Medium	
Kharif crops				
Paddy	8.1590	7.8303	-	8.0505
Maize	3.8167	4.1130	-	3.9145
Cabbage	-	-	-	-
Tomato	-	-	-	-
Capsicum	-	-	-	-
Rabi crops				
Wheat	-	-	-	-
Peas	-	-	-	-
Cabbage	8.2664	10.6424	-	9.0505
Cauliflower	10.2075	11.3606	-	10.5880

Source: Field Survey **Area size-classes are determined from net operated area of unprotected crops*

6.15 As far as productivity of crops on unprotected condition of farming is concerned, Table-6.9 reflects sans paddy, productivity of all crops is marginally higher, in case of cabbage production, the marginal farmers yield as much as 5 per cent higher production than the small farmers.

6.16 But ,when one considers the production of all crops of the sampled farmers, production of paddy in terms of quintal is marginally higher in marginal farmers than the small farming households. In this case on an average the marginal farms grow 4 per cent higher production in paddy than the small farm size class. For maize, cabbage and cauliflower production of the small farms is much higher than the marginal farmers. In case of cabbage, it is almost 28 per cent higher than the marginal farmers.

Table 6.11. Value of Output from Crops on Sampled Farms (Unprotected Cultivation)

(Value in Rs/farm)

Crops	Category			All
	Marginal	Small	Medium	
Kharif crops				
Paddy	14446.39	13931.85	-	14276.59
Maize	6919.10	7500.06	-	7110.82
Cabbage	-	-	-	-
Tomato	-	-	-	-
Capsicum	-	-	-	-
Rabi crops				
Wheat	-	-	-	-
Peas	-	-	-	-
Cabbage	11658.69	14970.52	-	12751.60
Cauliflower	29644.11	30797.08	-	30024.59

Source: Field Survey **Area size-classes are determined from net operated area of unprotected crops*

6.17 It derives from the production data that value of output of all crops considering the two sowing seasons reflects the same picture where value of output of cabbage is almost similar to the earlier findings and in numerical figures states 28 per cent higher for small farmers in comparison to other category of farmers.

6.18 In case of sample farms of Sikkim, as all costs relating to the construction of polyhouse has been subsidized by the Government, calculations relating to PBP (Pay Back Period), NPV (Net Present Value), IRR (Internal Rate of Return) and BCR (Benefit-Cost Ratio) do not arise to analyze project worth of cultivation under polyhouse cover.

CHAPTER - VII

Marketing System of Protected Crops

7.1 The marketing system of crops grown under polyhouse cover, referred to here as protected crops, is of special interest for the state of Sikkim. The government of Sikkim monitors the entire marketing system minutely for the welfare of the farmers. In fact, to facilitate the process FPO (Farmers-Producers-Organization) has been formed. 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 nearby towns like Gangtok for the Farmers'-Producers'-Organizations. There are 25-30 FPO's alias Self Help Groups functioning in the marketing kiosk. Each of them allotted separate places and the members themselves within the group 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.

7.2 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 (or farmers themselves) voluntarily act as liaison to this process. Owing to thus 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, depending upon market conditions. As such, the scope of intermediaries or commission agents is typically narrow, and there hardly exist any intermediaries in the marketing process. Neither the farmers have to dispose off their output to any wholesaler, but

they can directly sell their product to the consumers in the marketing kiosks set up by the government, or sale their product in the sub-divisional and district markets in nearby towns in stalls allotted to the farmers.

7.3 Before proceeding to examine the marketing system of protected crops in Sikkim, an analysis of the utilization of protected crops in relation to production seems to be important. It is seen that losses in the process of production of flowers like carnation and jarbera are quite high at 4.54 per cent and 4.25 per cent respectively as proportion of their respective production. Payment of wages in flowers is not observed, while retention for family and for gifts to others constitutes a very small proportion of production of both these flowers.

Table 7.1.(a) Production and Utilization of Protected Flower Crops on Sampled Farms

(Box. of 900 spikes)

Category	Production	Utilization			
		Losses	Retained for		
			Family	Gifts	Wages
Carnation (Box of 900 spikes)					
Small	257.96 (100.00)	11.71 (4.54)	0.81 (0.32)	0.75 (0.29)	0.00 (0.00)
Medium	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Large	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Overall	257.96 (100.00)	11.71 (4.54)	0.81 (0.32)	0.75 (0.29)	0.00 (0.00)
Jarbera (Box of 900 spikes)					
Small	454.80 (100.00)	19.34 (4.25)	0.92 (0.20)	1.46 (0.32)	0.00 (0.00)
Medium	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Large	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Overall	454.80 (100.00)	19.34 (4.25)	0.92 (0.20)	1.46 (0.32)	0.00 (0.00)

Source: Field Survey; Figures in parenthesis indicate percentages

7.4 Similarly, in case of utilization of vegetable crops, here capsicum and tomato, one can observe that losses in relation to production accounts for 2.70 per cent of production for capsicum and 2.55 per cent of production for tomato. Retention for family consumption is higher for tomato (4.64 per cent) than capsicum (1.46 per cent) of production, which in turn reflects dominance of tomato over capsicum in the

vegetable growers preferred food basket. However, both the crops are not utilized as gifts or wages, as evident from table 7.1.(b).

Table 7.1.(b) Production and Utilization of Protected Vegetable Crops on Sampled Farms

(Quintals)

Category	Production	Utilization			
		Losses	Retained for		
			Family	Gifts	Wages
Capsicum (Box of 20 kg)					
Small	975.55 (100.00)	26.30 (2.70)	14.25 (1.46)	0.00 (0.00)	0.00 (0.00)
Medium	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Large	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Overall	975.55 (100.00)	26.30 (2.70)	14.25 (1.46)	0.00 (0.00)	0.00 (0.00)
Tomato (Box of 25 kg)					
Small	513.08 (100.00)	13.08 (2.55)	23.80 (4.64)	0.00 (0.00)	0.00 (0.00)
Medium	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Large	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Overall	513.08 (100.00)	13.08 (2.55)	23.80 (4.64)	0.00 (0.00)	0.00 (0.00)

Source: Field Survey Figures in parenthesis indicate percentages
Note: Both crops are sold loose, and not in boxes

7.5 Now, if one examine the marketing pattern of the protected flower crops (viz. Carnation and jarbera), presented here in table 7.2(a), one can observe that both the flowers are sold only in the local markets, and not to far-off markets. This is particularly true as the FPOs mostly shoulder that system of marketing of flowers and vegetables, and forwards it to local markets, where the flower growers often act as retailers themselves. At the same time, as the farmers are engaged in extremely small in size of production, they have very little to sell in the far-off markets in a profitable notion, bearing all associated costs in transportation and marketing.

7.6 In fact, it can be observed that more than 64.63 per cent of carnation and 61.24 per cent of jarbera marketed directly to the consumers through FPOs in organic kiosks or in road-side kiosks by the flower growers themselves (termed as 'others' in Table 7.2(a)), while rest of the flowers are sold in nearby markets through FPOs.

Table 7.2.(a) Marketing Pattern of Protected Flower Crops on Sampled Farms

(no. of spikes)

Category	Sold at							
	Far off market		Other*		Local markets		Total	
	Qty (no.)	Rate/spike	Qty (no.)	Rate/spike	Qty (no.)	Rate/spike	Qty (no.)	Rate/ spike
Carnation (Box of 900 spikes)								
Small	0.00 (0.00)	0.00	153.13 (64.63)	9.23	83.79 (35.37)	9.41	236.92 (100.00)	9.29
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
Overall	0.00 (0.00)	0.00	153.13 (64.63)	9.23	83.79 (35.37)	9.41	236.92 (100.00)	9.29
Jarbera (Box of 900 spikes)								
Small	0.00 (0.00)	0.00	265.24 (61.24)	5.97	167.84 (38.75)	6.10	433.09 (100.00)	6.02
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
Overall	0.00 (0.00)	0.00	265.24 (61.24)	5.97	167.84 (38.75)	6.10	433.09 (100.00)	6.02

Source: Field Survey; Note: Both crops are sold loose, and not in boxes
** Others include selling directly to consumers in organic kiosks / road-side market*
Figures in parenthesis indicate percentages

7.7 Here, it is interesting to note however that for both carnation and jarbera, the price fetched per spike is slightly lower while selling directly to the consumers in organic kioks, as compared to the price fetched per spike while selling through the FPOs in nearby markets. This reflects that the fact that the price in general is higher in nearby markets in town like Gangtok than that in the marketing kiosks in the vicinity of the villages where the farmers reside.

7.8 In case of marketing pattern of the protected vegetable crops (here, capsicum and tomato), we can observe a similar pattern like that of flowers. In particular, it is evident from table 7.2(b) that a major portion of output marketed for both capsicum and tomato is sold directly to the consumers in local organic kiosks and road-side markets set up by the government of Sikkim, while the rest is sold in nearby markets in closest towns. None of these two selected crops for the study is sold in the far-off markets by the sample vegetable growers, which might be because of their extremely

small size of operation and production. In particular, 71.12 per cent of total capsicum marketed and 62.24 per cent of total tomato marketed is sold directly to the consumers in organic kiosks or road-side markets, while the rest is sold in nearby towns through FPOs.

Table 7.2.(b) Marketing Pattern of Protected Vegetable Crops on Sampled Farms

(Quintals)

Category	Sold at							
	Far off market		Others*		Local markets		Total	
	Qty (qtls)	Rate/qtl	Qty (qtls)	Rate/qtl	Qty (qtls)	Rate/qtl	Qty (qtls)	Rate/qtl
Capsicum (Box of 20 kg)								
Small	0.00 (0.00)	0.00	665.00 (71.12)	3420.79	270.00 (28.88)	4686.33	935.00 (100.00)	3786.24
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
Overall	0.00 (0.00)	0.00	665.00 (71.12)	3420.79	270.00 (28.88)	4686.33	935.00 (100.00)	3786.24
Tomato (Box of 25 kg)								
Small	0.00 (0.00)	0.00	295.40 (62.24)	4480.43	179.20 (37.76)	4405.16	474.60 (100.00)	4452.01
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
Overall	0.00 (0.00)	0.00	295.40 (62.24)	4480.43	179.20 (37.76)	4405.16	474.60 (100.00)	4452.01

Source: Field Survey; Note: Both crops are sold loose, and not in boxes
** Others include selling directly to consumers in organic kiosks / road-side markets*
Figures in parenthesis indicate percentages

7.9 In case of marketing costs and price-spread of protected crops in Sikkim, it needs to be noted that as the marketing of crops is done either by the farmers themselves (directly to the consumers) and (or) through the FPOs in nearby towns, there is complete absence of middlemen, commission agents, etc. Neither the farmers have to bear any market fee and other such charges. The only costs involved in marketing are on the part of the farmers for assembling, packing, grading and transportation.

Table 7.3.(a) Marketing Costs and Price Spread of Carnation in the Market

Particulars	Rs.	Percent
Net price received by grower	1981897.70	100.00
Growers expenses on		
(a). Assembling charges up to store	47950.00	2.42
(b). Grading& Packing	22900.00	1.16
(c). Packing material	25650.00	1.29
(d.)Transportation	65690.00	3.31
(i.) up to road head	0.00	0.00
(ii).I.S.B.T .to market	0.00	0.00
(iii). Misc. charges	0.00	0.00
(e). Commission of C.A.	0.00	0.00
Total expenses paid by the grower	162190.00	8.18
Wholesale / Gross price at market	-	-
(a).Market fee	-	-
(b).Other cost (spoilage, telephone charges etc.)	-	-
(c).Margin / Commission of C.A.	-	-
Mashakhors' purchase price	-	-
Expenses borne by Mashakhor	-	-
Margin of Mashakhor	-	-
Retailers' purchased. price	-	-
Expenses borne by the retailer		
(a). Carriage up to retail shop	-	-
(b). Losses	-	-
Total expenses paid by retailer	-	-
Retailers' Margin	-	-
Consumer price	1981897.70	100.00

Source: Field Survey

7.10 Whatever the costs are borne by the farmers are presented here in table 7.3.(a) and 7.3.(b) for carnation and jarbera respectively. It can be observed here that total expenses borne by the farmers for marketing of carnation stands at 8.18 per cent, while that for jarbera stands at 7.66 per cent of net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.

Table 7.3.(b) Marketing Costs and Price Spread of Jarbera in the Market

Particulars	Rs.	Percent
Net price received by grower	2346745.22	100.00
Growers expenses on		
(a). Assembling charges up to store	54800.00	2.34
(b). Grading& Packing	26820.00	1.14
(c). Packing material	28720.00	1.22
(d.)Transportation	69400.00	2.96
(i.) up to road head	0.00	0.00
(ii).I.S.B.T .to market	0.00	0.00
(iii). Misc. charges	0.00	0.00
(e). Commission of C.A.	0.00	0.00
Total expenses paid by the grower	179740.00	7.66
Wholesale / Gross price at market	-	-
(a).Market fee	-	-
(b).Other cost (spoilage, telephone charges etc.)	-	-
(c).Margin / Commission of C.A.	-	-
Mashakhors' purchase price	-	-
Expenses borne by Mashakhor	-	-
Margin of Mashakhor	-	-
Retailers' purchased. price	-	-
Expenses borne by the retailer		
(a). Carriage up to retail shop	-	-
(b). Losses	-	-
Total expenses paid by retailer	-	-
Retailers' Margin	-	-
Consumer price	2346745.22	100.00

Source: Field Survey

7.11 Therefore, in the absence of market intermediaries of any kind, gross price received by the growers are synonymous to consumer paid price, at least as in case of protected crops grown by the sample farmers in Sikkim. This is clearly reflected in table 7.4(a) and 7.4(b) as follows-

Table 7.4.(a) Marketing Costs and Margins of Intermediaries in Carnation Marketing

Particulars	Rs.	Percentage
Gross price received by growers	1981897.70	100.00
Cost of farmers	162190.00	8.18
Cost of wholesalers	-	-
Cost of Mashakhor	-	-
Cost of retailers	-	-
Total marketing cost of intermediaries	-	-
margin of wholesalers	-	-
margin of Mashakhor	-	-
margin of retailers	-	-
Total marketing margin	-	-
Consumer Paid price	1981897.70	100.00

Source: Field Survey

Table 7.4.(b) Marketing Costs and Margins of Intermediaries in Jarbera Marketing

Particulars	Rs.	Percentage
Gross price received by growers	2346745.22	100.00
Cost of farmers	179740.00	7.66
Cost of wholesalers	-	-
Cost of Mashakhor	-	-
Cost of retailers	-	-
Total marketing cost of intermediaries	-	-
margin of wholesalers	-	-
margin of Mashakhor	-	-
margin of retailers	-	-
Total marketing margin	-	-
Consumer Paid price	2346745.22	100.00

Source: Field Survey

7.12 A similar observation as in case of protected flowers can also be made for the protected vegetables as well, particularly because of the fact that both of the selected vegetable crops (viz. capsicum and tomato) are either marketed directly to the consumers and(or) through the FPOs in nearby towns. As the entire marketing

process is set up by the state government, there is complete absence of middlemen and other intermediaries in case of vegetable marketing also.

Table7.5. (a) Marketing Costs and Price Spread of Capsicum in the Market

Particulars	Rs.	Percentage
Net price received by grower	708026.75	100.00
Growers' expenses on		
Picking, packing, grading and assembling	25015.00	3.53
Packing material	8330.00	1.18
Transportation	22050.00	3.11
(i.) Carriage up to road head	0.00	0.00
(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	55395.00	7.82
Wholesale / Gross price at market	-	-
Expenses of wholesaler / CA		
Handling charges	-	-
Margin / Commission	-	-
Sub-total	-	-
Mashakhors' purchase price	-	-
Expenses borne by Mashakhor	-	-
Margin of Mashakhor	-	-
Retailers' purchased. price	-	-
Expenses born by retailer		
Carriage up to retail shop	-	-
Losses	-	-
Total expenses paid by retailer	-	-
Retailers' Margin	-	-
Consumer price	708026.75	100.00

Source: Field Survey

7.13 In particular, in case of capsicum, the total expenses borne by the grower on account of marketing stands at 7.82 per cent, while that for tomato stands at 7.81 per cent of net price received by the grower, which in turn equals to consumer price

(table 7.5(a) and 7.5(b). The case for price-spread of these protected crops does not arise in the absence in market intermediaries.

Table7.5. (b) Marketing Costs and Price Spread of Tomato in the Market

Particulars	Rs.	Percentage
Net price received by grower	528231.25	100.00
Growers' expenses on		
Picking, packing, grading and assembling	18282.00	3.46
Packing material	6415.00	1.21
Transportation	16550.00	3.13
(i.) Carriage up to road head	0.00	0.00
(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	41247.00	7.81
Wholesale/ Gross price at market	-	-
Expenses of wholesaler/CA		
Handling charges	-	-
Margin/Commission	-	-
Sub-total	-	-
Mashakhors' purchase price	-	-
Expenses borne by Mashakhor	-	-
Margin of Mashakhor	-	-
Retailers' purchased. price	-	-
Expenses born by retailer		
Carriage up to retail shop	-	-
Losses	-	-
Total expenses paid by retailer	-	-
Retailers' Margin	-	-
Consumer price	528231.25	100.00

Source: Field Survey

7.14 Here table 7.6(a) and table 7.6(b) reflects the same observations made earlier in case of marketing of protected vegetable crops, showing that the consumer paid price equals the price received by the growers in the absence of intermediaries for reasons stated earlier.

Table 7.6.(a) Marketing Costs and Margin of Intermediaries in Capsicum at the Market

Particulars	Rs.	Percentage
Gross price received by growers	708026.75	100.00
Cost of farmers	55395.00	7.82
Cost of wholesalers	-	-
Cost of Mashakhor	-	-
Cost of retailers	-	-
Total marketing cost of intermediaries	-	-
Margin of wholesalers	-	-
Margin of Mashakhor	-	-
Margin of retailers	-	-
Total marketing margin	-	-
Consumer Paid price	708026.75	100.00

Source: Field Survey

Table 7.6(b). Marketing Costs and Margin of Intermediaries in Tomato at the Market

Particulars	Rs.	Percentage
Gross price received by growers	528231.25	100.00
Cost of farmers	41247.00	7.81
Cost of wholesalers	-	-
Cost of Mashakhor	-	-
Cost of retailers	-	-
Total marketing cost of intermediaries	-	-
Margin of wholesalers	-	-
Margin of Mashakhor	-	-
Margin of retailers	-	-
Total marketing margin	-	-
Consumer Paid price	528231.25	100.00

Source: Field Survey

7.15 Moving our focus towards analysis of production losses for the selected crops, we may recall our earlier findings in table 7.1(a) and 7.1(b). In fact, we have seen earlier that the total production losses for the selected crops carnation, jarbera, capsicum and tomato are 4.54 per cent, 4.25 per cent, 2.70 percent and 2.55 per cent respectively.

Table 7.7. Production Losses at Various Stages on All Farms (only Small Farmer)

Crops	Pre harvest losses%	Post harvest losses %			
		Picking	Assembling	Grading & Packing	Transportation
Carnation	2132.00 (0.92)	3349.00 (1.44)	1616.00 (0.70)	1751.50 (0.75)	1691.50 (0.73)
Jarbera	2808.00 (0.69)	6564.00 (1.60)	2249.00 (0.55)	2947.00 (0.72)	2834.00 (0.69)
Capsicum	1.39 (0.71)	.90 (0.46)	.82 (0.42)	.67 (0.34)	1.63 (0.84)
Tomato	.97 (0.76)	.68 (0.53)	.62 (0.48)	.47 (0.37)	1.01 (0.79)

Source: Field Survey; Figures in parenthesis indicate percentage of total production

7.16 As our sample comprises only small farms, we have not made any separate analysis for small, medium and large farms. Rather here we have analyzed the results for all the farms (i.e small farms only) in Table 7.7.

7.17 It can be observed here that in case of carnation and jarbera, the selected flowers for the study, loss of production occurs primarily while picking of flowers (1.44 per cent and 1.60 per cent of production respectively). On the other hand, the major source of production loss in case of selected vegetables, here capsicum and tomato, comes out to be pre-harvest losses and losses in transportation.

Chapter- VIII

Problems in Cultivation of Protected Crops

8.1 Novelty of cultivation of horticultural crops in protected condition lies mainly on its structure and the scientific method and appliances are used for these purposes. A very general and common view of growing horticulture crops under protected condition is to exploit the natural moisture and sunlight along with recommended doses of organic manure and nourishing and treating the sapling in an appropriate manner. In this perspective, construction of poly-houses, its sizes and nature of structure seem to play a crucial and interestingly, in this case not a single farmer has raised any issues regarding problems faced during construction of poly-houses. The reason behind this – all the poly-houses are allotted by the Department of Horticulture, Government of Sikkim. Specification and size of poly-houses, its nature and location/site etc. all are being fixed or settled by the government itself. Moreover, all these poly-houses are generally built by the contractor themselves, enlisted by the government of Sikkim for this purpose only under active supervision and vigil (as reported) by the government officials. Hence, the farmers are tight lipped and restrained their emotions (if any) rather let it transferred to the representative of the Department for doing the needful at their end. Table-8.1

Table 8.1. Responses Regarding Problems Faced During Construction of Polyhouses

(Multiple Responses in %)

Type of problem	Category			All
	Small	Medium	Large	
Information	0.0	0.0	0.0	0.0
Design	0.0	0.0	0.0	0.0
Loan	0.0	0.0	0.0	0.0
Subsidy	0.0	0.0	0.0	0.0
Construction	0.0	0.0	0.0	0.0

Source: Field Survey

8.2 Multiple responses are received from the respondents during problems faced for in time and non-availability of inputs for horticultural production. From quarries it

is found that among small farmers category almost 64 per cent of the respondents positively asserted about the higher price of the inputs, while 76 per cent of them alleged the quality of inputs are inferior in nature. (Table 8.2)

Table 8.2. Responses Regarding Problems Faced in Inputs Availability

(Multiple Responses in %)

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

Source: Field Survey

Table 8.3. Responses Regarding Problems Faced in Cropping Practices

(Multiple Responses in %)

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

Source: Field Survey

8.3 Again multiple responses are received from the farmers regarding problems faced in cropping practices. Table-8.3 reveals that almost 44 per cent of the respondent alleged about non- timeliness and intensity of irrigation. 32 per cent of the respondents want more inter culture operation and more intense cropping practices. The extension officers have a positive role to play in enhancing sowing intensity as well as intensity of irrigation. In this perspective it is worth mentioning that from the observation the researchers found that 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 big drams and in emergency completes the irrigation by stretching small pipes to the nearby horticulture fields. Approximate distance for carrying water from source ranging between 1 km to 2.5 kms in the study area. Some of them have made R.C.C. water tank in their yard and use water for drinking as well as irrigation purposes.

Table 8.4. Responses Regarding Problems Faced in Harvesting, Storage etc.

(Multiple Responses in%)

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

Source: Field Survey

8.4 Earlier a brief discussion was held relating to the problem of harvesting and other ancillary problems associated with it. It is derived from table-8.4 that besides harvesting, storage, packing, processing and marketing of produce is the major off-farm problems are being faced by the sampled farmers. In time harvesting with proper processing and storage facilities to a significant extent enable the vendible commodities to keep in fresh and clean conditions. Ostensibly, these fresh and clean products fetch reasonably higher prices in the domestic as well as foreign markets. In this case about 72 per cent of the respondents reported against availability of proper storage facilities, and almost 48 per cent of them have reported non availability of better marketing facilities for their product causes an inhibiting factor for further development and prosperity.

8.5 For successful implementation of any scheme, dissemination of ideas, perceptions of the beneficiaries to whom it was actually targeted and assimilation of experiences based on these attributes have a crucial role to play. In this case also a

multi-pronged questionnaire was canvassed among the respondents to have insights about the status of implementation of MIDH Scheme in the state of Sikkim.

Table 8.5. Perception of Farmers on Protected Cultivation

(Multiple Responses in%)

Particulars	Category			All
	Small	Medium	Large	
Protected cultivation has helped to increase production	100.0	0.0	0.0	100.0
Protected cultivation has increased employment opportunities	100.0	0.0	0.0	100.0
Income has grown up after protected cultivation of crops	100.0	0.0	0.0	100.0
Protected cultivation facilitated adoption of organic farming	100.0	0.0	0.0	100.0

Source: Field Survey

8.6 The response is somehow encouraging as almost all the farmers who are engaged in producing horticultural crops under protected cultivation reported that protected cultivation has helped to increase their production to a large extent. Not only that protected cultivation has increased their employment opportunities, level of income and well being, protected cultivation acts as facilitator for adopting organic method of farming also. Adoption of such eco-friendly nature of cultivation has unanimously enhanced the quality of soil and undoubtedly it could be pondered as two-step forward for attaining sustainable development through optimum resource use and application and assimilation of modern and scientific method of cultivation for sustenance only (Table 8.5).

Chapter- IX

Conclusions and Policy Implications

Concluding Observations

The major findings of the present study may be summarized here as follows-

A) Present Scenario of Poly house Development under MIDH

- In case of polyhouse development under MIDH in Sikkim, we can see that the Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in all the districts of Sikkim.
- An area of 415.96 ha has been covered under protected cultivation, while 48835 farmers have been trained under various horticulture activities.
- An amount of Rs. 373.47 crore was released to the State till 2014-15 and the State Government has reported an expenditure of 328.97 crore.

B) Socio-Economic Features of Poly house Owners

- Average family size of the small farmers is 4.21 with high educational standards. The major primary occupation is farming, while the subsidiary occupation is self-employment in non-farming sector.
- Average net operated area turns out to be 1.05 ha, while only 38 per cent of total cultivated land is irrigated.
- A major portion of non-farm income for the farm households comes from salary, followed by animal husbandry and petty business.

C) Motivations/Hindrances and Costs Involved in Playhouse Construction

- The sample polyhouses for the present study are simple in design with single-tier cultivation only. Information regarding polyhouses and scheme/subsidy has been obtained from the state department of agriculture itself, and from friends & relatives to limited extent.

- It is reported that a continuous efforts of the Government Officials, the possibility of higher income, easy access to technology and availability of subsidy acted as key motivating factors for protected cultivation.
- Besides the contractor's delay in construction of polyhouses, adjustment with the new crop growing technology has been found to have acted has hindrances for the growth of protected cultivation. However, the implementing authority took a supportive/neutral role in the supervision of polyhouse construction.
- It comes out that majority of the farmers are yet to adjust to new cropping practices introduced, especially organic cultivation, while all the farmers suggested improving storage facilities.
- It was observed that equipments like heater, cooler, humidifier, and fogger are absent in all of the poly-houses. Only 60 per cent of farms are provided with drip irrigation facilities, while 52 per cent of farms have built vermin-compost pits.
- It is observed that 60 per cent of the farmers received training from the government sources, while 39 per cent of them are benefitted from the nearby Krishi Vigyan Kendra (KVK).

D) Costs and Returns from Protected Crops

- It is observed that in case of carnation and jarbera, the selected flower crops for the study grown under polyhouse cover, an overwhelming proportion of total costs are spent on purchasing sapling for producing carnation flower followed by costs of pesticides (organic), formation of beds and for application of fertilizer (organic).
- It was observed that though cost for cultivation for jarbera under protected condition is significantly higher in comparison to carnation, percentage of net returns in jarbera over carnation is also higher and it is due to higher value of output.

- *In case of the selected vegetable crops under polyhouse cover, viz. capsicum and tomato, it has been observed that* net returns in case of tomato is marginally lower than in case of capsicum cultivation.
- Cultivation of paddy and maize in Kharif season and cabbage and cauliflower in Rabi season are the other significant crops grown by the sample farms in unprotected condition. Except paddy, the cost for absorption of family labour in all other unprotected crops has been found to be higher in marginal farmers than the small farms.
- As far as productivity of crops on unprotected condition of farming is concerned, it is observed that apart from paddy, productivity of all crops for marginal farms is marginally higher than small farms.

E) Marketing System of Protected Crops

- The marketing system of crops grown under polyhouse cover is of special interest for the state of Sikkim. In fact, the government of Sikkim has formed FPOs (Farmers-Producers-Organizations), who collect vendible commodities from the farmer and pay the price. For this purpose one motor van (pick-up van) for each FPO has been provided to collect farmers' product from the assemble point (mutually convenient place of the village cluster) and then to dispose it in the nearby market. Moreover, the government of Sikkim has constructed a wide marketing kiosk at the central place of nearby towns like Gangtok for the Farmers'-Producers'-Organizations. Separate places for each of them allotted and operational works are done by the members themselves of each group. Besides disposing off a bulk of their product to the FPOs for marketing, sometimes the farmers carry their product in the marketing kiosk and (or) road-side organic markets for retail marketing by themselves.
- Losses in the process of production of flowers like carnation and jarbera are quite high at 4.54 per cent and 4.25 per cent respectively as proportion of their respective production. Payment of wages in flowers is not observed, while retention for family and for gifts to others constitutes a very small proportion of production of both these flowers.

- In case of utilization of vegetable crops, we can observe that losses in relation to production accounts for 2.70 per cent of production for capsicum and 2.55 per cent of production for tomato. Retention for family consumption is higher for tomato (4.64 per cent) than capsicum (1.46 per cent) of production.
- In case of marketing pattern of the protected flower crops, we can observe that both the flowers are sold only in the local markets, and not to far-off markets. In fact, it can be observed that more than 63.63 per cent of carnation marketed and 61.24 per cent of jarbera marketed has been sold directly to the consumers through FPOs in organic kiosks or in road-side kiosks by the flower growers themselves.
- In case of marketing pattern of the protected vegetable also, we can observe that 71.12 per cent of total capsicum marketed and 62.24 per cent of total tomato marketed is sold directly to the consumers in organic kiosks or road-side markets set up by the government, while the rest is sold in nearby towns through FPOs.
- As the entire marketing process is set up by the state government, there is complete absence of middlemen and other intermediaries in case of marketing of protected crops by the farmers, either in road-side kiosks or in markets I major towns. Market fee and other such costs are also not observed as the markets are set up and controlled by the government itself.
- It can be observed here that total expenses borne by the farmers for marketing of carnation stands at 8.18 per cent, while that for jarbera stands at 7.66 per cent of net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.
- In case of capsicum, the total expenses borne by the grower on account of marketing stands at 7.82 per cent, while that for tomato stands at 7.81 per cent of net price received by the grower, which in turn equals to consumer price in the absence of middlemen or market intermediaries.
- Total production losses for the selected crops carnation, jarbera, capsicum and tomato are 4.54 per cent, 4.25 per cent, 2.70 percent and 2.55 per cent respectively.

- In case of carnation and jarbera, loss of production occurs primarily while picking of flowers (1.44 per cent and 1.60 per cent of production respectively), while the major source of production loss in case of selected vegetables comes out to be pre-harvest losses and losses in transportation.

Policy Implications

Based on the major findings of the present study, the following policy implications may be stated as under-

- As Sikkim has the favourable climatic conditions for growing vegetables, flowers and horticultural crops, policies like MIDH should be obviously help to augment growth in agriculture, especially in growing vegetables, flowers and horticultural crops 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.. 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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ANNEXTURE-I

Coordinator's Comments on the Draft Report

An Economic Analysis of Protected Cultivation under MIDH in Sikkim
AERC, VISVA – BHARATI, SANTINIKETAN

Reviewer's Comments

Title of the report:

An Economic Analysis of Protected Cultivation under MIDH in Sikkim

Date of assignment received for review: March 10, 2017

Date of dispatch of the comments: April 20, 2017

Comments on the objectives of the study:

The objectives of the study are properly addressed

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

By and large, the study has been undertaken in right perspective. The following suggestions are put forwarded for kind perusal of the authors:

- Executive summary has to be written in single column with bullets only in objectives and policy implications.
- Each paragraph should be numbered in all the chapters including "Conclusions and Policy Implications". In Chapter IX, bullets should be applied to policy implications only.
- Page 8, line 8 from bottom: Polly Houses should be changed to polyhouses.
- Avoid writing we and us in the report (e.g. page 8 & 29).
- Heading of Chapter II: Methodology
- Page 10 , line 11 from top: Staring should be changed to starting.
- Page 10: Classification of the polyhouse farmers will not change for unprotected cultivation. Same is applicable to unprotected crops in Chapter VI.
- Page 12: The reference year of the report is 2015-16.
- Number of figures after decimal should be uniform (e.g. page 23).
- Page 23: Table 4.4: 7(3.70 should be 7(3.70).
- Page 27: Table 5.1: In row 2 under Small and All, pl. write 100.

- Page 32: Pl. check the interpretation of Table 5.8.
- Pl. delete Tables 5.13 to 5.16 and write one line at the end of this chapter that: The information regarding cost of construction of polyhouse structures & other equipments was not available as these are sponsored by the State Government in Sikkim and hence farmers also did not avail any loan for construction of polyhouses.
- The tables should indicate figures in percentage terms along with absolute figures {Table Nos. 6.2(a) & 6.2(b) and 6.5(a) & 6.5(b)} as suggested by peer reviewer.
- Tables 7.1(a) to 7.2(b) are not prepared according to the given format. Even crops are sold loose and not in boxes, but can be converted into boxes. This is necessary for consolidation of all the reports. Along with the quantity sold in different markets, percentage figures may also be indicated in Tables 7.2 (a) and 7.2 (b) as suggested by peer reviewer.
- The manuscript may be edited once again to avoid the common mistakes, typographical or otherwise.

Overall view on the acceptability of the report:

The report may be accepted with incorporation of the above suggested modifications.

ANNEXTURE-II

Action Taken Report

An Economic Analysis of Protected Cultivation under MIDH in Sikkim
AERC, VISVA – BHARATI, SANTINIKETAN

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

- Executive summary is written in single column with bullets only in objectives and policy implications.
- Each paragraph in all the chapters has been numbered as per suggestion. In Chapter IX, bullets are applied to policy implications only.
- Page 8, line 8 from bottom: Polly Houses spelling is corrected.
- The advice to "Avoid writing we and us in the report (e.g. page 8 & 29)" has been followed.
- Heading of Chapter II: Methodology only done as suggested.
- Page 10 , line 11 from top: starting spelling is corrected.
- Page 12: The reference year of the report is corrected as suggested.
- Done as suggested.
- Page 23: Table 4.4: Correction has been made by 7(3.70).
- Page 27: Table 5.1: Done as suggested.
- Page32: Table 5.8: Done as suggested.
- Table Nos. 6.2(a) & 6.2(b) and 6.5(a) & 6.5(b) have been modified along with revision of corresponding analysis, as suggested .
- Tables 7.1(a) to 7.2(b) have been modified along with revision of corresponding analysis, as suggested.
- Done as suggested.

Authors