AERC Report

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AN ECONOMIC ANALYSIS OF PROTECTED CULTIVATION UNDER MIDH IN JAMMU & KASHMIR

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Background

The greenhouse technology is still in its developing stage in the country and concerted efforts are required from all concerned agencies to bring it at par with the global standards. Inside polyhouse crops can be grown throughout the year. The quality of flowers produced in open fields is not of international standards. Production of vegetables and flowers crops under protected conditions not only is of high quality, but also increases the productivity and profitability of crops over open field cultivation and give better living standard to farmers. But in the sampled areas of J&K; it is in very primary stage and the polyhouses were generally less than 100 m^2. Farmers of J&K are facing several challenges such as small land holding, poor yields due to reliance on inefficient methods of farming, too much dependence on natural phenomena such as rainfall and lack of knowledge of modern methods of agriculture and above all of these lot of disturbances.

In Jammu and Kashmir State especially in Kashmir Division, horticulture plays a significant role in contributing to the development of the economy of the state. As per estimates, over 6 lac families are actively involved in horticulture sector. This sector is one of the most important employment generating sectors in the state. The growth of horticulture sector can be attributed to various initiatives taken by the GoI and State Govt; towards market interventions viz. establishment of fruit mandies, technological support, awareness options, publicity inputs, research extension etc. The area under vegetables and fruits in J&K has increased from 76.50 thousand hectares in the year 2005--06 to 100.7 thousand hectares in the year 2012-13. But most of its farmers have small landholdings on hill slopes, and need to augment their incomes. The state and central governments are encouraging construction of polyhouses by giving subsidies to the farmers. Thus it becomes essential to study the costs, returns and economic feasibility of flowers and vegetable production under protected cultivation in J&K. With this aim, the Ministry of Agriculture and Farmers Welfare entrusted this study to Agro Economic Research Centre, H.P. University, Shimla.

The present study was planned with the following specific objectives:

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.

The State of J&K has three regions; namely, Jammu, Kashmir and Ladakh. The topography and climate of two regions, Kashmir and Ladakh is the same as that of other hilly states under the study like Himachal Pradesh. Therefore, these two regions, comprising of twelve districts, were purposively selected for the study from Jammu and Kashmir and two districts were selected on the basis of highest number of polyhouses. From the selected districts, three development blocks have been selected, again on the basis of highest number of polyhouses. From each of these development blocks, a cluster of villages having polyhouses was identified with the help of the local officials of the department of horticulture. All the registered polyhouse were listed and a sample of 50 growers of vegetables was randomly selected. Thus a total sample of 100 vegetable growers (50 from each district) was selected for detailed study. The study refers to the agriculture year 2015-16.

Main Findings

According to the data of the Directorate of Agriculture, Kashmir, Govt. of J&K the polyhouse farmers of the region were raising only nursery inside the polyhouses (no. 3575) and the nursery raised inside these polyhouses was planted in the area of 286.08

ha. with production of off season vegetables of 7120 MT. The same was observed in the sampled area.

The horticulture department was the main source of authentic and detailed information about the polyhouses. The friends & relatives, awareness camps and mass media were inspired the farmers to set up polyhouses. The decision making process of the farmers to adopt protected cultivation was influenced by variety of motivational factors and hindrances they encountered before setting up of polyhouses. Most of the polyhouses were supervised by the department officers/officials whose attitude was very supportive towards the farmers. There were some deviations from the approved design of the polyhouses which were due to lack of funds.

As the sampled farmers were raising only nursery of vegetables inside polyhouse, therefore costs, returns and marketing of protected vegetable/flower crops could not be observed. However, a brief analysis of vegetables grown outside the polyhouse was carried out.

The crops grown in kharif season(outside polyhouse) were cabbage, cauliflower and capsicum whereas in Rabi season cabbage, cauliflower and knolkhol were the crops grown by the sampled farmers. In kharif season, the area per farm was more (0.18 ha.) in cabbage followed by cauliflower (0.16 ha.) and capsicum (0.02 ha.). In Rabi season area per farm was maximum (0.17 ha.) in cauliflower followed by cabbage (0.15 ha.) and knolkhol (0.04 ha.)

The cost of cultivation of cabbage, cauliflower, capsicum and knolkhol were Rs.49559, Rs.56156, Rs.46480 and Rs.48490 per hectare respectively. The highest cost component in all the crops was manure followed by human labour except in the case of capsicum where the growers incurred maximum expenditure on human labour. There was no expenditure on irrigation and hired machinery in any of the crops.

As far as the productivity of crops grown under unprotected conditions is concerned, in kharif season the productivity was maximum (265 qtls./ha.) in cabbage with total production 48 qtls./farm followed by the productivity of cauliflower (255 qtls./ha.) having total production 41.69 qtls./farm and the productivity of capsicum (245qtls/ha.) with total

production 6.19qtls./farm. In Rabi season the productivity of knolkhol was found to be maximum (260 qtls./ha.) followed by the productivity of cabbage (250 qtls/ha.) and cauliflower (Rs.239 qtls./ha.). In Rabi season the production of cauliflower per farm was maximum (41 qtls.) followed by cabbage (38 qtls.) and knolkhol (12 qtls.)

Among the grown crops highest value per farm was observed in the case of cauliflower in both the seasons i.e. Rs. 83380 and Rs.82000 in kharif and rabi season respectively followed by cabbage (Rs.73485 and Rs.57000/farm), knolkhol (Rs.24000/farm in rabi season) and capsicum (Rs.13618/farm in kharif season).

Although the raising seedlings in polyhouses was found to be useful in producing off season vegetables outside polyhouses, the activity is not free from problems. In most of the cases execution of the polyhouse was delayed due to the long and cumbersome clearance procedure adopted by various departments for sanctioning polyhouse and clearance of loan & subsidy. The construction was further delayed by the contractor. Delay in technology transfer was another reason due to which the polyhouses could not become operational well in time. Once a polyhouse became operational, unavailability of inputs, higher prices or poor quality of inputs were the problems faced by farmers in raising nursery.

Policy Implications

The sampled farmers were raising only seedling inside polyhouses. However, the profitability from the polyhouses can be improved by taking the following steps.

- The cropping practices of crop production are significantly different in polyhouses than that of growing crops or vegetables outside the polyhouse. Polyhouse farming requires skill monitoring and care. Before polyhouses become operational, the growers should be given proper training related to cultural practices i.e. raising nursery and crops, intensity of irrigation, the most appropriate sowing and harvesting time.

- Inputs used in the polyhouses to raise the nursery should be provided to farmers through the department on subsidized rates. They should be provided best quality seeds at cheaper rates.
- Organic farming should be introduced and promoted in the polyhouses for healthy crop.
- Besides raising nursery, crops should also be grown in the polyhouses. But to do so the polyhouses of larger size should also be constructed.

CHAPTER–1

Introduction

1.1 Due to the increasing population, climate change, decreasing land holdings, increasing pressure on natural resources i.e. land and water and high demand of quality horticultural fresh produce, shift becomes necessary towards modern technologies of crop production like protected cultivation. Protected cultivation is a unique and specialized form of agriculture. It is the technique of providing favourable conditions for plant growth and enhances the production level. It protects plants from the adverse climate conditions by providing optimum conditions of light, temperature, humidity, Co_2 and air circulation for the best growth of plants to achieve maximum yield and best quality.

1.2 In India use of green house technology started only during 1980's and it was mainly used for research activities. However in recent years in view of the globalization of international market, there is a lot of scope for export of high value cash crops like flowers and vegetables from India, besides meeting the increasing demand in domestic market. The new and effective technology which can improve continuously the productivity, profitability and sustainability of crops is 'Protected Cultivation" and is generally called greenhouse technology. With the coordinated efforts of the Centre and state governments, protected cultivation is gaining popularity in India. At present in India, the area under protected cultivation is around 25 thousand hectares while the area under protected cultivation is about 2 thousand hectares. Leading states in protected cultivation in India are Maharashtra, Gujrat, Karnatka, Haryana, J&K, Himachal Pradesh and Uttarakhand.

1.3 The national committee on the use of plastics in Agriculture (NSPA- 1982) has recommended location specific trials of green house technology for adoption in various regions of the country. In the present day context a good number of different type of structure are built for protected cultivation. These are polythene covered green houses (polyhouses), shade-net houses, plastic tunnels, plastic mulching etc. Among these protective cultivation techniques, greenhouse/polyhouse is useful for the hill zones. Protected cultivation provides various benefits over open field cultivation as follows:

- Protection from adverse climatic conditions.
- Moderates temperature and humidity.
- Plant propagation is effective.
- Helps to improve quality and quantity of produce.
- Reduces infestation of disease/plants.
- Savings in water and fertilizer requirements as compared to open field cultivation.
- Reduces gestation period of the crop.
- Harvesting time can be adjusted.
- Round the year cultivation is possible.
- Useful technology for hybrid seed production.
- Employment generating technology.

History of Protected Cultivation

1.4 Protected cultivation is not new technology and is more than 200 years old. From the ancient times, man strived to modify the environment through the use of devices such as windbreaks, shading, irrigation, drainage, fertilizers, and other cultural practices to improve the cultivation of different crops under varying conditions. All such efforts were to modify the environment but has little control on climate and other factors which is responsible for the crop production. Structures for crop protection began in early part of roman Empire (14-37 AD), which have movable beds of cucumbers or other crops, placed outside on favourable days and inside during inclement weather. Transparent state like plates or sheets of mica or alabaster were used as covers (Wittwer and Castilla, 1995). During late 15^{th} to 18^{th} centuries that the precursors of greenhouses appeared, primarily in England, Holland, France, Japan, and China. Later oiled translucent paper and glass were used to grow and warm plants against severe cold (Jensen & Malter, 1994). After 1600 AD, glass was the major covering material. Polythene film was developed in the late 1930s. The polythene film was first used to cover greenhouse to replace expensive glass panels in 1948 by Prof. E.M. Emmert in University of Kentucky to reduce the cost of construction (Espi et al. 2006). After that it is adopted all over world and almost replaced the glass panels except for special purpose greenhouses. However, plastic rigid panels are also being used in place of glass panels with similar results. Bamboo and wooden sticks were the popular material for construction of frame of the structure in 15-19^{th} century which was slowly replaced

with metallic channels or pipes. Presently, all over the world, GI pipes or channels are most preferred material with varying specifications, while MS pipes angles are also being used at some locations with required paints/coatings.

Protected Cultivation in J&K

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

1.6 The state is endowed with ample natural resources including soil, water diversity in topography, climatic conditions, and rich natural flora facilitating the cultivation of a wide range of flowers. The valley of Kashmir is famous for its beauty and bounty across the length and breadth of the globe is blessed with the richness in bio-diversity of mighty Himalayas. The nature has been kind enough in providing unique / congenial agro-

climatic conditions, owing to which the valley is best, suitable for flower production. Commercial cut flower production of Tulip crop is now done under controlled conditions from Mid December in Kashmir Division on a modest scale. But in the selected areas, the flowers were not grown under protected conditions.

1.7 Vegetable nursery raising under protected cultivation/ poly houses is very popular in J&K. Generally in Kashmir region, in polyhouses only seedlings are raised and by planting these seedlings in the field, the yield is taken in advance than the normal method of direct sowing. Raising of vegetable nursery in polyhouses has many folds benefits such as easy management, early nursery and protection from biotic and abiotic stress. This technology fetches the higher prices due to marketing of produce in off season. Such production system has extended the growing season of vegetables and also their availability whole the year. The seedlings of cucurbits, tomato, chilli, capsicum, brinjal, cucumber, cabbage, cauliflower and broccoli are grown under plastic cover in the polyhouses.

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

Mission for Integrated Development of Horticulture

1.9 A centrally sponsored scheme of MIDH has been launched for the holistic development of horticulture in the country during XII plan. The scheme which has taken off from 2014-15, integrated the ongoing schemes of National Horticulture Mission,

Horticulture Mission for North East & Himalayan States (HMNEH, the scheme being implemented for overall development of Horticulture in NE and three Himalayan states, Jammu & Kashmir, Himachal Pradesh and Uttarakhand), National Bamboo Mission, National Horticulture Board, Coconut Development Board and Central Institute of Horticulture Nagaland.

Main objectives of the Mission

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.

Review of Literature

1.10 Kumar and Srivastava (1997) studied the influence of plastic coverings on the temperature and relative humidity under low plastic tunnels in tomato field during the winter-spring season in 1990-1991 at horticultural research centre, G.B. Pant University of Agriculture and Technology, Pantnagar. The minimum and maximum temperature and relative humidity were significantly increased inside the polyethylene tunnels of all gauges viz. 200, 300 and 400 as compared to no cover in all the weeks. The 300 and 400 gauge plastic always proved superior to lower gauge. The 100 perforations/m^2 always showed highest minimum temperature whereas, maximum temperature continuously from 50 perforations to 150 perforations. In most of the weeks, perforations had no significant effect on relative humidity.

1.11 Ganesan, M. (1999) found that the yield performance of tomato inside the green house was highest 2145g per plant and 2156g per plant in the first and second season (January to May and June to October) than the open field crops. The fruit yield of tomato inside the green house was nearly two times more than in the open field condition.

1.12 Singh et al (2002) conducted a study on sustainable technology for peri-urban areas of northern India. Protected cultivation of vegetables provides the best way to

increase the productivity and quality of vegetables especially cucurbits. The yield of cucumber can be increased manifold compared to open field cultivation. Normally the economics of protected cultivation directly depends upon the initial cost of fabrication of the protected structure, its running cost and the available market for the high quality produce. Therefore, low cost protected structure, which can generally be fabricated just like naturally ventilated green houses, walk in tunnels and plastic low tunnels are very suitable for off-season cultivation of vegetables and highly economical for peri-urban areas of northern plains of India.

1.13 Cheema et al. (2004) studied the off season cultivation of tomato under net house conditions and found that net house cultivation has extended the fruit availability of tomato from last week of January to first week of June. The study has offered the possibility of raising off-season crop of tomato and enhancing the fruit availability period by using non-chemical methods of pest control.

1.14 Singh and Asrey (2005) studied the performance of tomato and sweet pepper under unheated green house. The production of tomato and sweet pepper under medium cost green house was found top the tune of 93.2 and 76.4 t/ha respectively. It was of excellent quality as compared to outside where the crop could not survive due to prevailing low temperature. The study also indicated that cultivation of tomato and sweet pepper under green house would not only help in getting higher productivity but also fetch better returns (Rs.7-8 per m^2 per season),

1.15 Dixit (2007) studied the performance of leafy vegetables under protected environment and open field condition. An experiment was conducted on leafy vegetables (Spianch, amarathus, fenugreek, and coriander) at horticultural research farm, India Gandhi Agricultural University, Raipur (C.G), to see the performance of leafy vegetables under protected environment and in open field condition. Green house crops yield several times more than the yields obtained from outdoor cultivation depending upon the cropping system and the degree of environmental control. The germination percentage was found 10-20% more in green house as compared to open field. The yield was found to be more and superior as compared to open field condition.

1.16 Singh and Sirohi (2008) found that protected cultivation vegetables offers distinct advantages of quality, productivity and favourable market price to the growers. Vegetable growers can substantially increase their income by protected cultivation of

vegetables in off-season as the vegetables produced during their normal season generally do not get good returns due to large availability of these vegetables in the markets. Off-season cultivation of cucurbits under low plastic tunnels is one of the most profitable technologies under northern plains of India. Walk-in tunnels are also suitable and effective to raise off-season nursery and off-season vegetable cultivation due to their low initial cost. Insect proof net houses can be used for virus free cultivation of tomato, chilli, sweet pepper and other vegetables mainly during the rainy season. These low cost structures are also suitable for growing pesticide free green vegetables. Low cost green houses can be used for high quality vegetable cultivation for long duration (6-10 months) mainly in peri-urban areas of the country to fetch commensurate prices of produces. Polytrenches have proved extremely useful for growing vegetables under cold desert condition in upper reaches of Himalayas in the country.

1.17 Murthy D.S. et. al. (2009) studied the economic feasibility of vegetable production under polyhouse and found that cultivation of capsicum in a polyhouse was highly feasible as reflected in higher values of NPV (Rs.3,23,145/500 m^2), BCR (1.80) and IRR (53.7%) with payback period of less than two years. Breakeven price for capsicum production in a polyhouse (Rs.11.80/kg) was lesser than average wholesale price. Production of tomato in a polyhouse was found not feasible, as the breakeven price was more than the average market price and all the project appraisal parameters indicated that it was not feasible. Only at about 48% premium price over the prevailing market price or reduction of cost of polyhouse structure by 60% from Rs.400 to Rs.160/m^2, could make the tomato production viable in a poly house.

1.18 Kouser Parveen Wani, Pradeep Kumar Singh, Asima Amin, Faheema Mushtaq and Zahoor Ahmad Dar (2011) studied the protected cultivation of tomato, capsicum and cucumber under kashmir valley conditions. The study revealed that the seedlings of tomato, chilli, capsicum, brinjal, cucumber, cabbage, cauliflower and broccoli can be grown under plastic cover protecting them against frost, severe cold and heavy rains. The environmental conditions particularly increase in temperature inside polyhouse hastens the germination and early growth of warm season vegetable seedlings for raising early crops in spring summer. Vegetable nursery raising under protected conditions is becoming popular throughout the country especially in hilly regions. Management of vegetable nursery in protected structure is easier and early nursery can be raised. Needless to emphasize, this practice eliminates danger of destruction of

nurseries by hail storms and heavy rains because world highest rains occur in this region and the period of rainy season is also wide (April to October). Protection against biotic and abiotic stresses becomes easier.

1.19 Bahirat J.B. and Jadhav H.G. (2011) studied the cost, returns and profitability of rose production in the Satara district of Maharastra and found that per hectare cost of cultivation of rose was Rs.2,94,791. Among the various items of cost, maximum cost was incurred on family labour (30.41%) followed by rental value (21.50%). Cultivation of rose was profitable at all the level of cost. Per hectare yield of rose was 2,24,166. The gross value received was Rs.380242. Benefit cost ratio was 1:1.29.

1.20 Sudhagar, S. (2013) studied the production and marketing of cut flower in Hosur taluk of Tamil Nadu and concluded that floriculture has emerged as a lucrative profession with higher potential for returns compared to other agricultural, horticultural crops. Ornamental crop culture technology is improving with the availability of equipment and there is a major change in the trend of consumers. A new generation of growers is coming forward to employ modern technology for maximising production and offer quality produce for consumer acceptability, thus fetching a better price.

1.21 Brij Bala (2013), studied the investment pattern of different polyhouse and economics of crop cultivation in polyhouses in Kullu and Mandi district of Himachal Pradesh. It was found that the total cost of construction was Rs.100500, Rs.216250 and Rs.481600, respectively for polyhouses of 100, 250 and 500 sq.meter and farmers had to invest only 20 percent of the total cost. It was observed that 85 percent of the farmers grew capsicum, tomato and cucumber in their polyhouses as main crops and exotic vegetables as covering crops. It was estimated that a farmer could have net returns upto Rs.1.42 lacs per annum from a 500 sq.m polyhouse. A manifold increase in resource use efficiency crop production can be obtained through protected cultivation when compared with the open field conditions.

1.22 Tarannum et.al. (2014) studied the economic feasibility and profitability of carnation cultivation under protected condition. Carnation being a perennial crop with an economic life span of 3-5 years, the annual establishment and maintenance cost worked out to Rs. 1, 39,657/560 m2 . Among the different genotypes studied highest gross returns were obtained from genotype Soto (Rs. 4,90,140.00/ 560 m2), followed by Dona (Rs. 4,20,00.00/560 m2) and White Dona (Rs. 3,99,000.00/560 m2) with a net

return of Rs. 3,50,483.00, 2,80,343.00, and Rs. 2,59,43.00/560 m2 , respectively compared to other genotypes grown under polyhouse. The investment in Carnation crop was found to be economically sound and highly remunerative as these genotypes produce highest yield (flower stalks) per unit area resulted in maximum B:C ratio of 2.50, 2.00 and 1.85 respectively, hence the same can be exploited for commercial cultivate on to meet the increasing global demand.

1.23 Ghanghas, B.S. and Mukteshwar, Rati (2015) studied the problems and prospects of protected (polyhouse) cultivation in Hisar and Rohtak districts of Haryana state and found that vast majority of farmers used to grow vegetable (cucumber and tomato) crop. Multiple cropping on the same piece of land, increased production and productivity per unit of land, water, energy and labour, high quality and clean products, high water and fertilizer use efficiency, subsidy provision for establishment of this high cost infrastructure, round the year employment to the farmers were the major prospective aspects of the polyhouse cultivation by farmers. Population explosion of minute insects like mites and white flies, poor quality of cladding material, frequent occurrence of wind storms, lack of cold storage facilities in villages, high cost of hybrid seed and problem of nematode infestation were the major serious constraints faced by the polyhouse growers.

1.24 Spehia, R.S. (2015), studied the status and impact of protected cultivation in Himachal Pradesh. The study revealed that on an average, the productivity under protected cultivation was 3.36 times more than compared to open cultivation. Capsicum was the most dominant crop under polyhouse cultivation getting maximum income from polyhouses at it showed net income of Rs.213, 830(including self labour) in a 500 sq mt. Area. This was followed by tomato (Rs.77,127) and cucumber (Rs.34,756). A total of 0.132 man days were required per sq.mt. for carrying out different operations from soil bed preparation to harvesting, making it an attractive option for the youth.

1.25 Duhan Kumar Pardeep (2016) has made an attempt to examine the comparative economics of tomato under polyhouses and open field conditions in Haryana and concluded that the production cost and production were higher in polyhouse as compare to open farm. Moreover, the production of tomato was more than three times in polyhouse as compare to open farm. The market price of tomato that produces in polyhouse was higher than the tomato produce in open farm. In long run polyhouse

seems more economic as polyhouse production earn more than ten time benefit to the farmers as compare to open farm farmers.

1.26 Kumar, Parveen, Chauhan, R.S and Grover, R.K. (2016) studied the comparative economics of tomato cultivation under polyhouse and open field conditions in Karnal district, Haryana. Production and marketing constraints under polyhouse cultivation have also been identified. The study revealed that the cost of cultivation of tomato under polyhouse were higher by Rs.206816.80/acre as compared to open field conditions. At the same time, the net returns under polyhouse were higher by Rs.51097.54/acre. Farmers realized 53.71% higher yield of tomato under polyhouse as compared to open field conditions. The gross return, returns over variable cost and net returns were also higher by 106.94%, 160.70% and 48.70% respectively in case of polyhouse as compared to open field conditions. The results of the study also revealed that the tomato cultivation under polyhouses has significantly contributed to the yield.

1.27 Choudhary, A.K. (2016), studied the potential and prospects of protected cultivation in Himachal Pradesh and found that protected cultivation has great potential in the State to increase quality production per unit area per unit time. Timely efforts by the state government under Horticulture Technology Mission (HTM) and Pandit Dean Dayal Kisan Bagwan Samridhi Yojna (PDDKBSY) have scaled up protected cultivation and have proved to be a boon to small and marginal hill farmers.

1.28 With this background, the present study was planned with the following specific objectives:

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

1.29 This report is divided into nine chapters. In the introductory chapter, that is the current chapter, some background information, literature survey, objectives of the study and the plan of the study are given. The second chapter presents the detailed information on the methodology adopted in the selection of the sample, analytical tools etc. In the third chapter present scenario of polyhouse cultivation in the State has been presented taking into consideration various schemes etc. available to farmers for adoption of this technology. The profile of the sampled polyhouse growers is given 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. The title of Chapter 6 is given as "Costs and Returns from Protected Crops" for the uniformity with the same studies conducted in other hilly states, but costs and returns from protected crops in this chapter and marketing of these crops in Chapter 7 could not be studied due to reasons mentioned in "**Limitations of the Study**" (Chapter- 2). However, a brief analysis of vegetables grown outside the polyhouse was carried out in Chapter 6. The problems in raising vegetable nursery in polyhouses are discussed in eighth chapter and chapter nine concludes the study with policy implications.

CHAPTER-2

Methodology

2.1 This chapter deals with the selection procedure adopted for finalizing the sample for detailed study. During this exercise, care has been taken to make the sample as representative of the population as possible so that the findings based on sample could be applied for the population as a whole without significant error.

Selection of Study Districts and Blocks

2.2 The State of J&K has three regions; namely, Jammu, Kashmir and Ladakh. The topography and climate of two regions, Kashmir and Ladakh is the same as that of other hilly states under the study like Himachal Pradesh. Therefore, these two regions, comprising of twelve districts, were purposively selected for the study from Jammu and Kashmir and two districts were selected on the basis of highest number of polyhouses (Table 2.1(a)). As is evident from the table, the polyhouse farmers of the region were raising only nursery inside the poly houses (3575) and the nursery raised inside these polyhouses was planted in the area of 286.08 ha. with production of off season vegetables of 7120 MT. During the field survey (in the selected districts of Budgam and Srinagar) also, it was found that the sampled polyhouse farmers were raising only nursery of vegetables inside polyhouses. Hence no off season vegetables were grown inside polyhouses. Further, the farmers of selected area were neither raising nursery of flowers nor growing flowers inside polyhouse. Thus the study is confined to raising nursery of vegetables inside polyhouse.

2.3 From the selected districts, three development blocks have been selected, again on the basis of highest number of polyhouses. From each of these development blocks, a cluster of villages having polyhouses was identified with the help of the local officials of the department of horticulture. All the registered polyhouse were listed and a sample of 50 growers of vegetables was randomly selected. Thus a total sample of 100 vegetable growers (50 from each district) was selected for detailed study. The details of the districts, blocks and villages selected for the study are given in Table 2.1(b).

Table 2.1(a). Present Status of Off-Season Vegetable Production in Kashmir Division-2015

Sr. No.	District	No. of Polyhouses	Area under Polyhouses (raising seedling) ha.	Area covered ha.	Production MT
1.	Anantnag	330	1.32	26.40	733.90
2.	Baramulla	460	1.84	36.80	1008.30
3.	Bandipora	165	0.66	13.20	367.00
4.	Budgam	630	2.52	50.40	1562.40
5.	Ganderbal	132	0.53	10.56	293.60
6.	Kulgam	158	0.63	12.64	351.40
7.	Kupwara	340	1.36	27.20	756.20
8.	Pulwama	412	1.65	32.96	988.80
9.	Shopian	124	0.49	9.92	275.80
10.	Srinagar	530	2.12	42.40	129.32
11.	Leh	160	0.64	12.80	355.80
12.	Kargil	134	0.54	10.80	298.00
Total		3575	14.30	286.08	7120.52

Source: Directorate of Agriculture , Kashmir, Govt. of J&K.

Table 2.1(b). Selection Area of the Sample

District	Blocks	Villages
Budgam	Budgam Chadoora	Narkara, Budgam Dooniwara, Kralpora Zimipora, B.K. Pora
Srinagar	Srinagar	Maloora, Zainkote Rawlpora, Lal Bazzar Gund Hassi, Nowgam Newtheed, Rambigrah Shungdipora, Hondamohal Harwan

Classification of Sample

2.4 It was observed during the survey that the polyhouses were generally less than 100 m^2 and as per the study format they all have fallen in the small category, i.e (upto 250m^2). The study, based on 100 small polyhouse cultivators (50 from each district), is assigned by the Ministry of Agriculture and Farmers Welfare, GOI to this centre. The classification of sampled poly house owners has been presented in Table 2.2.

Table 2.2. Classification of Sampled Polyhouse Owners Under MIDH

(No.)

District	Size class			Total
	Small (250 M^2)	Medium (500 M^2)	Large (1000 M^2)	
Budgam	50	-	-	50
Srinagar	50	-	-	50
All	100	-	-	100

Social Classification

2.5 The cast wise distribution of sampled polyhouse farmers is given in Table 2.3. All the households of Budgam and Srinagar district fall in the general category

Table 2.3. Social Classification of Sampled Polyhouse Owners

(No.)

Particulars	Small	Medium	Large	Total
Budgam				
SC	-	-	-	-
ST	-	-	-	-
OBC		-	-	
General	50(100)	-	-	50(100)
Total	50(100)	-	-	50(100)
Srinagar				
SC	-	-	-	-
ST	-	-	-	-
OBC		-	-	
General	50(100)	-	-	50(100)
Total	50(100)	-	-	50(100)
Overall				
SC	-	-	-	-
ST	-	-	-	-
OBC	-	-	-	-
General	100	-	-	100
Total	100	-	-	100

Note. Figures in parentheses denote percentages.

The Data

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

Analytical Tools

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

Limitations of the Study

2.8 There are some limitations of the study which are given below:

- As observed during the field survey and supported by data (Table 2.1(a)) provided by Directorate of Agriculture, Kashmir, Govt. of J&K, the sampled polyhouse farmers were raising only nursery of vegetables inside polyhouses. Further, the farmers of selected area were neither raising nursery of flowers nor growing flowers inside polyhouse. Thus the report confined to study the present scenario of polyhouse development under MIDH in the State, socio-economic features of polyhouse owners in the State, motivations/hindrances and costs involved in polyhouse construction, the cropping pattern, production, productivity and the economics of crops grown in open farms and problems in raising nursery inside polyhouse.
- The data and information reported in this study was gathered from various sources and the findings of the study are based on unrecorded data from growers who knowingly or unknowingly do not come out with actual facts.

Reference Period

The study refers to the agriculture year 2015-16.

CHAPTER-3

Present Scenario of Polyhouse Development Under MIDH in the State

3.1 J&K State is well known for its horticultural produce both in India and abroad. The state offers good scope for cultivation of horticultural crops, covering a variety of temperate fruits like apple, pear, peach, plum, apricot, almond, cherry and sub tropical fruits like mango, guava, citrus litchi, phalsa and Berete. Besides, medicinal and aromatic plants, floriculture, mushroom, plantation crops and vegetables are cultivated in the state. Apart from this, well known spices like saffron and black Zeera are also cultivated in some pockets of the state. As a result, there is a perceptible change in the concept of horticulture development in the state. In Jammu and Kashmir especially in Kashmir Division, horticulture plays a significant role in contributing to the development of the economy of the state. As per estimates, over 6 lac families are actively involved in horticulture sector. This sector is one of the most important employment generating sectors in the state. The growth of horticulture sector can be attributed to various initiatives taken by the GoI and State Govt; towards market interventions viz. establishment of fruit mandies, technological support, awareness options, publicity inputs, research extension etc. The area under vegetables and fruits in J&K has increased from 76.50 thousand hectares in the year 2005--06 to 100.7 thousand hectares in the year 2012-13.The state government has initiated protected farming through mission for integrated development of horticulture.

Mission for Integrated Development of Horticulture (MIDH)

3.2 Mission for Integrated Development of Horticulture (MIDH) is a Centrally Sponsored Scheme for the holistic growth of the horticulture sector covering fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo. While government of India (GOI) contributes 85% of total outlay for developmental programmes in all the states except the states in North East and Himalayas, 15% share is contributed by State Governments. In the case of North Eastern States and Himalayan States, GOI contribution is 100%. Guidelines regarding implementation of the scheme are described hereunder.

- MIDH has the following sub-schemes and area of operation

NHM

3.3 National Horticulture Mission (NHM) is one of the sub schemes of Mission for Integrated Development of Horticulture (MIDH) which is being implemented by State Horticulture Missions (SHM) in selected districts of 18 States and four Union Territories.

HMNEH

3.4 Horticulture Mission for North East & Himalayan States (HMNEH) is one of the sub schemes of Mission for Integrated Development of Horticulture (MIDH) which is being implemented by State Horticulture Missions (SHM) in the North Eastern States and Himalayan States.

NBM

3.5 National Bamboo Mission (NBM) is one of the sub schemes of Mission for Integrated Development of Horticulture (MIDH) which is being implemented by State Bamboo Development Agencies (BDA)/ Forest Development Agency (FDA) in all the States and UTs.

NHB

3.6 National Horticulture Board (NHB) is implementing various schemes under Mission for Integrated Development of Horticulture (MIDH) in all States and UTs.

CDB

3.7 Coconut Development Board (CDB) is implementing various schemes under Mission for Integrated Development of Horticulture (MIDH) in all Coconut growing states in the country.

- MIDH will work closely with National Mission on Sustainable Agriculture (NMSA) towards development of Micro-Irrigation for all horticulture crops and protected cultivation on farmers' field.
- MIDH will also provide technical advice and administrative support to State Governments/ State Horticulture Missions (SHMs) for the Saffron Mission and other horticulture related activities like Vegetable Initiative for Urban Clusters (VIUC), funded by Rashtriya Krishi Vikas Yojana (RKVY)/NMSA.

3.8 The protected cultivation in the State is regulated by the provisions of Operational guidelines (2014) issued by Government of India, Ministry of Agriculture. These operational guidelines are applicable for all the North East and Himalayan States. Activities like construction of shade net house, green houses, mulching, and plastic tunnels, anti bird/hail nets would be promoted under the Mission. Provision has been made for selecting a variety of construction material for green houses and shade net houses. Separate provision has been made for meeting the cost of cultivation under green house and shade nets, which includes cost of planting material and inputs. The

cost norms and pattern of assistance under MIDH applicable for protected cultivation are given in the following table.

Table 3.1. Cost Norms and Pattern of Assistance Under MIDH during XII for NHM and HMNEH Sub Schemes

Particulars	Maximum permissible cost	Pattern of assistance
Green House Structure		
Fan and pad system	Rs.1650/Sq.m (up to area 500 Sq.m) Rs.1465/Sq.m (>500 Sq.m up to 1008 Sqm) Rs.1420/Sq.m (>1008 Sq.m up to 2080 Sq.m) Rs.1400/Sq.m (>2080 Sq.m upto 4000 Sq.m) Above rates will be 15% higher for hilly areas.	50% of the cost limited to 4000 Sq. m per beneficiary
Naturally ventilated system		
Tubular Structure	Rs.1060/Sq.m (up to area 500 Sq.m) Rs.935/Sq.m (>500 Sq.m up to 1008 Sq.m) Rs.890/Sq.m (>1008 Sqm upto 2080 Sq.m) Rs.844/Sq.m (>2080 Sq.m upto 4000 Sq.m) Above rate will be 15% higher for hilly areas.	50% of the cost limited to 4000 Sq. m per beneficiary
Wooden Structure	Rs.540/Sq.m and Rs.621/Sq.m for hilly areas	50% of the cost limited to 20 units per beneficiary (each unit not to exceed 200 sq.m.)
Bamboo Structure	Rs.450/Sq.m and Rs.518/Sq.m for hilly areas	50% of the cost limited to 20 units per beneficiary (each unit should not exceed 200 sq.m)
Shade Net House		
Tubular Structure	Rs.710/Sqm and Rs.816/Sq.m for hilly areas	50% of cost limited to 4000 sq.m. per beneficiary.
Wooden Structure	Rs.492/Sqm and Rs.566/Sqm for hilly areas	50% of cost limited to 20 units per beneficiary(each unit not to exceed 200 sq.m.)
Bamboo Structure	Rs.360/Sqm and Rs.414/Sqm for hilly areas	50% of cost limited to 20 units per beneficiary(each unit not to exceed 200 sq.m.
Plastic Tunnels	Rs.60/Sqm and Rs.75/Sqm for hilly areas	50% of cost limited 1000 sq.m. per beneficiary.
Walk in Tunnels	Rs.600/Sqm	50% of cost limited to 5000 sq.m. per beneficiary
Anti Bird/Anti Hail Nets	Rs.35/Sqm	50% of cost limited to 5000 sq.m. per beneficiary
Cost of planting material & cultivation of high value vegetables grown in polyhouse	Rs.140/Sq.m	50% of cost limited to 4000 sq.m. per beneficiary.
Cost of planting material & cultivation of Orchid and Anthurium under polyhouse /shade net house	Rs. 700/Sq.m	50% of cost limited to 4000 sq.m. per beneficiary.
Cost of planting material and cultivation of Carnation and Gerbera under poly house/share net house	Rs.610/Sq.m	
Cost of planting material & cultivation of Rose and Lilum under polyhouse /shade net house	Rs.426/Sq.m	50% of cost limited to 4000 sq.m. per beneficiary
Plastic Mulching	Rs.32000/ha and Rs.36800/ha for hilly areas	50% of the total cost limited to 2 ha per beneficiary

Horticulture Mission for North East and Himalayan States (HMNEH) in J&K

3.9 The Centrally Sponsored Scheme of Horticulture Mission for North East and Himalayan States (HMNEH) is being implemented in J&K since 2001-02. From April 2014 onwards, HMNEH has been subsumed under MIDH and is being implemented in the State covering important horticulture crops. Under the scheme Centre had approved to cover 19.33 ha. area under protected cultivation with an assistance of 477 lakhs during the year 2015-16.The physical and financial progress under MIDH (Feb. 2015) in J&K are given in the following table.

Table 3.2. Physical and financial progress under –MIDH Feb. 2015 in J&K

(Rs. In Lacs)

Activity/Component	Unit	Rate of Asstt.(Rs. In lacs/unit	Phy Targets*	Achs*	Fin. Outlay	Expdt.
Protected Cultivation						
A.Green House Structure	-	-	-	-	-	-
a.Fan and Pad System (50%) cost for a maximum area of 4000 sq. Mtr per beneficiary	Sq.M	0.0094875	500	0	4.7438	0.0000
B.Naturally Ventilated System				0	0.0000	0.0000
i.Tubular Structure (50% cost for a maximum area of 4000 sq. Mtr per beneficiary	Sq.M	0.005300	45205	15300 (33.85)	239.5865	63.7850
ii.Wooden Structure (200 Sq. Mtr per beneficiary)	Sq.M	0.003105	62550	22779 (36.42)	194.2178	66.2800
iii)Bamboo Structure (200 Sq. Mtr per beneficiary)	Sq.M	0.002590	3820	107 (2.80)	9.8938	0.2770
C.Plastic Mulching (50% of the total cost limited to 2 ha per beneficiary	Ha	0.18400	17	0	1.8400	0.0000
D.Shade Net House				0	0.0000	0.0000
a.Tubular Structure (50% cost for a maximum area of 4000 sq. Mtr per beneficiary)	Sq.M	0.00408	14350	3842 (26.77)	58.5480	9.2800
b.Wooden structure (50% of cost limited to 20 units each unit not to exceed 200 sq. mtr	Sq.M	0.00283	3000	0	8.4900	0.0000
c.Bamboo Structure 50% of cost limited to 20 units each unit not to exceed 200 sq. mtr	Sq.M	0.00207	3145	0	6.5102	0.0000
E.Anti Bird/Anti hail nets (50% cost limited to 5000 sq. mtr per beneficiary)	Sq.M	0.000175	89000	4925 (5.53)	15.5750	2.3200
F.Cost of planting material and cultivation of Carnation/Gerbera under poly house/shade net house. (50% of cost limited to 4000 sq.mtr per beneficiary)	Sq.M	0.00305	3000	1995 (66.5)	9.1500	2.7680
G.Cost of planting material and cultivation of Rose and Lilum under poly house/shade net house. (50% of cost limited to 4000 sq. mtr per beneficiary)	Sq.M	0.00213	8000	980 (12.25)	17.0400	0.0000

Note.1. Figures in parenthesis denote percentages. 2. * unit is given in second column.

3.10 It can be seen from Table 3.2, that under green house structure, no amount was spent on fan and pad system. But in case of Naturally ventilated system – Tubular Structure –an amount of Rs 63.78 lakhs was spent where maximum permissible amount to be spent was Rs.239.58 lakhs. On Wooden Structure (200 Sq. Mtr per beneficiary), a total sum of Rs. 66.28 lakhs was spent from the maximum permissible amount of Rs.194.21 lakhs. Other details of physical and financial progress under this scheme on different components can be seen from the table. The proposed action plan for the year 2015-16 is also given below:

Table 3.3. Proposed Action Plan 2015-16 under MIDH in J&K

Activity/Component	Unit	Rate of Asstt. (Rs. In Lacs)	Phy*	Fin (Rs. In Lacs)
Protected Cultivation				
A.Green House Structure –Fan and Pad system (50% cost for a maxi area of 4000 sq. Mtr.	Sq.M	0.009	0	0.0000
B.Naturally Ventilated System				
i)Tubular Structure (50% cost for a maximum area of 4000 sq. Mtr per beneficiary)	Sq.M	0.006	50252	306.2870
ii)Wooden Structure(200 Sq. Mtr per beneficiary)	Sq.M	0.003	13310	41.3276
iii)Bamboo Structure (200 Sq. Mtr per beneficiary)	Sq.M	0.003	1000	2.5900
C. Plastic Mulching (50% of the total cost limited to 2 ha per beneficiary	Ha	0.184	110	20.2400
D.Shade Net House				
a.Tubular Structure (50% cost for a maximum area of 4000 sq. Mtr per beneficiary)	Sq.M	0.004	9500	38.7600
b.Wooden structure (50% of cost limited to 200 units	Sq.M	0.003	2000	5.6600
c.Bamboo Structure 50% of cost limited to 20 units	Sq.M	0.002	1000	2.0700
E.Anti Bird/Anti hail nets (50% cost limited to 5000 sq. mtr per beneficiary)	Sq.M	0.000	34223	5.9890
f.Cost of planting material and cultivation of high value veg. in poly house etc	Sq.M	0.001	10000	7.0000
g.Cost of planting material and cultivation of Carnation/Gerbera under poly house/shade net house	Sq.M	0.003	8400	25.6200
i.Cost of planting material and cultivation of Rose and Lilum under poly house/shade net house	Sq.M	0.002	7000	14.9100
j. Promotion of Integrated Nutrient Management (INM) Integrated pest Management (IPM)				
a.Promotion of IPM/INM (30% of cost subject to a max Rs.1200/ha limited to 4.00 ha/beneficiary)	Ha	0.012	3000	36.0000
b. Disease forecasting unit (PSUs) Public sector)	Nos	6.000	0	0.0000
c.Bio-Control Lab (100% Public/50% Private) Public sector	Nos	90.000	1	35.0000
d.Plant Health Clinics (100% Public/50% Private) private sector	Nos	25.000	0	0.0000
e.Leaf/Tissue analysis labs (100% Public/50% Private) public sector	Nos	25.000	0	0.0000

. * unit is given in second column.

CHAPTER-4

Socio-Economic Features of Polyhouse Owners in the State

4.1 Information about the socio-economic conditions of the sampled polyhouse farmers of the study areas provide the basis for understanding the background of these farmers and the conditions under which they function. Such conditions influence the processes followed in the production and marketing to a great extent. In this chapter an attempt has been made to study the socio-economic characteristics of all the sampled polyhouse farmers of Budgam and Srinagar districts of Jammu and Kashmir. It was observed during the field survey that all the sampled polyhouse farmers were of small category only. It is in this context that the demographic structure i.e. family size, education, occupation and economic factors like land utilization, income etc. of the small polyhouse farmers have been discussed.

Family Size

4.2 The study of family size is important from the labour availability point of view. An examination of average family size (Table 4.1) reveals that this size was 10.38 persons.

Table 4.1. Average Family Size of Sampled Households

Family Size	Category			
	Small	Medium	Large	All
No. of persons	10.38	-	-	10.38

Educational Status

4.3 The proportion of literates among people is an important indicator of its quality. Since cultivation of commercial crops like vegetables and flowers need special attention for obtaining better productivity, the knowledge of modern inputs and techniques of production and marketing is essential. For this education level of every member of farm family plays a crucial role. Keeping in view the importance of education the educational level of members of the sampled families is given in Table 4.2. According to this table 22.23 percent population of sampled households was illiterate and remaining 77.77

percent literate. Among the literates, the most prevalent standard of education was primary level (48.36%) followed by middle (19.06%) and secondary level (9.52%). The percentages of graduates and above graduates were negligible.

Table 4.2. Educational Level of Family Members of Sampled Households

(No.)

Particulars	Category			
	Small	Medium	Large	All
Illiterate	217(22.23)	-	-	217(22.23)
Primary	472(48.36)	-	-	472(48.36)
Middle	186(19.06)	-	-	186(19.06)
Secondary	93(9.52)	-	-	93(9.52)
Graduates	6(0.62)	-	-	6(0.62)
Above graduation	2(0.21)	-	-	2(0.21)
Total	976	-	-	976

Note. 1. Figures in parenthesis denote percentages. 2. Non school going children are not included in the table.

Occupational Structure

4.4 The main as well as subsidiary occupation of the sampled polyhouse farmers was analysed and presented in Tables.4.3 and 4.4 respectively.

Main Occupation

4.5 It can be seen from the Table 4.3 that agriculture was the main occupation of the majority (40.75%) of the farmers. Agricultural labour was reported as their main occupation by 17.92 percent of the farmers. About 11 and 31 percent of the total population of sampled farmers were of dependents and students respectively.

Subsidiary Occupation

4.6 The secondary occupational structure of the sampled polyhouse farmers was also studied along with the main occupational structure and presented in Table 4.4. About 26 percent of the total population reported farming as their subsidiary occupation and 17.92 percent stated that agricultural labour was their subsidiary occupation. About 31 and 11 percent of the total population comprised of students and dependents and 14.35 percent reported household work to be their subsidiary occupation.

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

(No.)

Particulars	Category			
	Small	**Medium**	**Large**	**All**
Farming	423(40.75)	-	-	423(40.75)
Service	-	-	-	-
Agri. Labour	186(17.92)	-	-	186(17.92)
Non-agri. Labour	-	-	-	-
Retired	-	-	-	-
Dependents	110(10.60)	-	-	110(10.60)
Household workers	-	-	-	-
Students	319(30.73)	-	-	319(30.73)
Others		-	-	
Total population	1038(100)	-	-	1038(100)

Note. Figures in parenthesis denote the percentages.

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

(No.)

Particulars	Category			
	Small	**Medium**	**Large**	**All**
Farming	274(26.40)	-	-	274(26.39)
Service	-	-	-	-
Agri. Labour	186(17.92)	-	-	186(17.92)
Non-agri. Labour	-	-	-	-
Retired	-	-	-	-
Dependents	110(10.60)	-	-	110(10.60)
Household workers	149(14.35)	-	-	149(14.35)
Students	319(30.73)	-	-	319(30.74)
Others	-	-	-	-
Total population	1038(100)	-	-	1038(100)

Note. Figures in parenthesis denote the percentages.

Land Resources

4.7 Land being the primary factor of production, the economic activity of a region mainly depends on the quantum of land resources available and their use. Land holdings in J&K are generally small. The land resources of the sampled farmers are presented in Table 4.5 in absolute terms and in Table 4.6 as percentages.

4.8 The average size of land holding provides the basis for judging whether a holding is good enough for cultivation. The average size of land holding was observed to be 0.37 for all the sampled farmers and all the land was cultivated and irrigated.

Table 4.5. Land Resources of Selected Protected Cultivators

(Ha./Farm)

Particulars	Category			
	Small	Medium	Large	All
1.Total land owned	0.37	-	-	0.37
a. Cultivated land	-	-	-	-
- Irrigated	0.37	-	-	0.37
- Un-Irrigated	-	-	-	-
b.Cultivable waste	-	-	-	-
c.Non cultivable	-	-	-	-
2.Leased in land	-	-	-	-
- Irrigated	-	-	-	-
- Un-Irrigated	-	-	-	-
3.Leased out land	-	-	-	-
- Irrigated	-	-	-	-
- Un-Irrigated	-	-	-	-
4.Net operated area	0.37	-	-	0.37
- Irrigated	0.37	-	-	0.37
- Un-Irrigated	-	-	-	-
Total	0.37	-	-	0.37

Table 4.6. Land Resources of Selected Protected Cultivators

(Percentages)

Particulars	Category			
	Small	Medium	Large	All
1.Total land owned	100	-	-	100
a.Cultivated land	-	-	-	-
- Irrigated	100	-	-	100
- Un-Irrigated	-	-	-	
b.Cultivable waste	-	-	-	-
c.Non-cultivable	-	-	-	-

Income From sources Other Than Crop Farming

4.9 In addition to income from farming, the farming households derive income from various other sources like animal husbandry, salary and agricultural and non-agricultural labour etc. The per farm annual income from various sources (other than crop farming)

of sampled polyhouse farmers is given in Table 4.7 whereas the percentage of income from various sources is presented in Table 4.8.

Table 4.7. Per Farm Annual Income From Other Sources

(Rs.)

Source of Income	Category			
	Small	Medium	Large	Overall
Animal husbandry	63950	-	-	63950
Income from salary	-	-	-	-
Business	-	-	-	-
Income from wages	87890	-	-	87890
Pension	-	-	-	-
Other	-	-	-	-
Total income	151840	-	-	151840

4.10 It can be seen from Table 4.7 that annual income per farm from animal husbandry and wages was Rs.63950 and Rs.87890 respectively. No income was observed from salary, business and pension. In percentage terms in Table 4.8 out of total income of all sampled farmers, the income from wages was 57.88 percent followed by income from animal husbandry.

Table 4.8. Per Farm Annual Income From Other Sources

(Percentages)

Source of Income	Category			
	Small	Medium	Large	Overall
Animal husbandry	42.12	-	-	42.12
Income from salary	-	-	-	-
Business	-	-	-	-
Income from wages	57.88	-	-	57.88
Pension	-	-	-	-
Other	-	-	-	-
Total income	100	-	-	100

CHAPTER -5

Motivations/Hindrances and Costs Involved in Polyhouse Construction

5.1 There are various factors and situations which act as deterrent and may act as hindrances that come in the way of adoption of polyhouse farming. It is with this background that the present chapter has been designed to see the motivations/hindrances in the adoption of the polyhouse technology and the costs involved in polyhouse construction.

Type of Polyhouses

5.2 Polyhouses are basically naturally ventilated climate control. Polyhouses have a variety of application like growing of vegetables, flowers etc. but during the field survey it was found that the sampled polyhouse farmers were raising only nursery inside polyhouses. Table 5.1 reveals that all the polyhouses were of simple type with single tier cultivation.

Table 5.1. Type of Polyhouses

(No.)

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

Sources of Information's About Polyhouse

5.3 There are various sources that provide the information to farmers related to polyhouses. Majority of the respondents received information from more than one source and therefore analysis in this respect is based on multiple responses. The results are given in Table 5.2. It can be seen from the table that for detailed and authentic information regarding polyhouses, horticulture department was the main source of information as revealed by 62 percent of polyhouse farmers followed by the source awareness camps and mass media each 56 percent, friends and relatives (43%) and seen in other villages (41%).

Table 5.2. Sources of Information About Polyhouse

(Multiple Responses in %)

Sources	Category			All
	Small	Medium	Large	
Horticulture Department	62	-	-	62
Friends/relatives	43	-	-	43
Seen in other villages	41	-	-	41
Awareness camps	56	-	-	56
Radio/News Paper etc.	56	-	-	56

Source of Information About Scheme/Subsidy/Technical Details

5.4 The polyhouse farmers were also asked about the sources of information about the scheme, formalities for getting loan/subsidy and for other technical details, by using the technique of multiple response and results are presented in Table 5.3. The table reveals that again horticulture department was the main source of information for most of the farmers (79%) followed by the information from awareness camps (45%) friends and relatives, radio, newspaper etc. each (35%) and seen in other villages (32%).

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

(**Multiple Responses in %)**

Sources	Category			Overall
	Small	Medium	Large	
Horticulture department	79	-	-	79
Friends/relatives	35	-	-	35
Seen in other villages	32	-	-	32
Awareness camps	45	-	-	45
Radio/News Paper etc.	35	-	-	35

Motivation Factors

5.5 Motivation factors are the situations or reasons which induce the farmers to adopt the activity. A list of such factors was prepared and multiple responses in this regard were taken from the respondents and presented in Table 5.4. The table shows that demonstrations about protected cultivation played an important role in motivating the farmers and thus the most important factor, motivating (65%) of the respondents. Possibility of high income was the second largest factor as revealed by 61 percent of the farmers. Fifty six percent stated that availability of man power was the motivating factor for the adoption of this technology. Less land and availability of suitable land

were the factors which motivated 37 and 36 percent of the respondents respectively. According to the 45 percent of farmers availability of subsidy was the motivating factor whereas 25 percent each stated that availability of easy loan, enough financial resources and easy control of insects/pests were the main factors.

Table 5.4. Motivation Factors for Adoption of Polyhouse

(Multiple Responses in %)

Sources	Category			All
	Small	Medium	Large	
Having Less land	37	-	-	37
Suitable land is available	36	-	-	36
Availability of manpower	56	-	-	56
Possibility of high income	61	-	-	61
Availability of subsidy	45	-	-	45
Availability of easy loan	25	-	-	25
Long crop duration	-	-	-	-
Easy control of insects/pests	25	-	-	25
Ready market for products	-	-	-	-
New crops can be grown	-	-	-	-
Enough financial resources	25	-	-	25
Availability of technology	-	-	-	-
Demonstration effect	65	-	-	65
Low availability of water for irrigation	10	-	-	10

Hindrances in Adoption of Polyhouse

5.6 Despite the fact that the farmers are motivated for adoption of polyhouses, there are various hindrances that come across in adoption of this technology. The analysis of such factors is important from the point of view of streamlining and refining the programme for higher adoption rates and this could be instrumental in programme success. A list of such possible hindrances was prepared and multiple responses in this regard were taken from the sampled farmers and presented in Table 5.5.

Table 5.5. Hindrances Encountered for Adoption of Polyhouse
(Multiple Responses in %)

Hindrances	Category			Overall
	Small	Medium	Large	
Cumbersome clearance from department	46	-	-	46
Delays in technology transfer	-	-	-	-
Long wait for loan clearance/subsidy	49	-	-	49
Construction materials not locally available	33	-	-	33
Contractor delayed the execution	45	-	-	45
High construction cost	15	-	-	15
Unavailability of skilled labour	10	-	-	10
Unsuitable farm location	25	-	-	25
Marketing problems of crops	-	-	-	-
Took time to adjust new crops growing technology	8	-	-	8

5.7 It can be seen from the table 5.5 that most of the respondents (49%) reported that there was long wait involved in getting clearance of loan and subsidy from the departments and 46 percent stated that clearance procedure adopted by various departments was long and cumbersome. Forty five percent respondents said that execution was delayed by the contractor and 25 percent complained about the unsuitable farm location. Thirty three, 15 and 10 percent respondents were of the view that construction materials not locally available, high construction cost and un-availability of skilled labour respectively were the hindrances to adopt this technology.

Departmental Supervision

5.8 The department supervise the construction of polyhouses to ensure the adherence to approved design and quality control in the construction. The results of the Table 5.6 reveal that 75 percent of the polyhouses were supervised by the officials. It is encouraging to note that the attitude of the officials during the supervision, in addition to ensure the quality and design aspect, was supportive to farmers. Fifty seven percent respondents were of the view that the attitude of officials was very supportive. Only 33 percent respondents felt the attitude to be neutral . None of the respondents found the

attitude to be discouraging. This fact can go a long way in making not only this scheme a success but the future endeavours of the department as well.

Table 5.6. Supervision of Polyhouse Construction by Officials

(%)

Particulars	Categories			All
	Small	Medium	Large	
Cases supervised	75	-	-	75
Attitude of Officials				
- Supportive	57	-	-	57
-Neutral	33	-	-	33
-Discouraging	-	-	-	-

Farmer's Suggestions for Improvement of Polyhouses

5.9 Farmers were asked about the suggestions for the improvement of polyhouses and they had some suggestions for improving the sustainability and viability of present system which are given in Table 5.7. The table depicts that 75 percent of the respondents had some suggestions for the improvement of polyhouses. Majority (55%)

Table 5.7. Suggestions for Improvement of Polyhouses

(%)

Particulars	Categories			All
	Small	Medium	Large	
Farmers with suggestions	75	-	-	75
Suggestions (Multiple Responses in %)				
Adaptation of design to local conditions	74	-	-	74
Cost saving measures	43	-	-	43
Crops to be grown	15	-	-	15
Cropping practices	38	-	-	38
Sources of inputs	55	-	-	55
Organic farming	45	-	-	45
Product processing and packing	-	-	-	-
Storage techniques	-	-	-	-
Marketing assistance	-	-	-	-

of the farmers suggested that inputs used in the polyhouses to raise the nursery should be provided to them through the department on subsidized rates. They should be provided best quality seeds at cheaper rates. Forty five percent respondents said that organic farming should be introduced and promoted in the polyhouses for healthy crop. According to 38 percent respondents information and training on cropping practices under protected conditions should be provided and forty three percent respondents suggested that cost saving techniques should be applied or made available. Only 15 percent were of the view that crops should also be grown in the polyhouses.

Delays in no Objection Certificate

5.10 Many respondents felt that there are delays in granting of No objection Certificate (NOC) from the department which could have been due to long departmental procedures or other priority assignments with the concerned officials. As in Table 5.8, 57 percent respondents revealed that they had to face some delay in granting NOC from the department due to which they had to face the financial hardships.

Table 5.8. Delays in No Objection Certificates (NOC)

(%)

Particulars	Categories			All
	Small	Medium	Large	
Farmers reporting delay	57	-	-	57
Farmers reporting No delay	43	-	-	43

Action by Contractor in Case of Delay in NOC

5.11 Only 3 percent respondents reported some action taken by contractor in case of delayed NOC (Table 5.9).

Table 5.9. Action by Contractor in Case of Delay in NOC

(%)

Particulars	Categories			All
	Small	Medium	Large	
Action reported	3	-	-	3
No action reported	97	-	-	97

Equipments Installed in Polyhouses

5.12 In the sampled areas, there were only simple type of polyhouses and only vermin-compost pit was installed in these polyhouses (Table 5.10).

Table 5.10. Equipments Installed in Polyhouses

(% of farmers)

Equipments installed	Categories			All
	Small	Medium	Large	
Heater	-	-	-	-
Cooler	-	-	-	-
Humidifier	-	-	-	-
Sun shade	-	-	-	-
Drip irrigation	-	-	-	-
Fogger	-	-	-	-
Water tank	-	-	-	-
Vermicompost pit	45	-	-	45

Deviations' from Recommended Design

5.13 Some minor deviations from the recommended designs were reported by the polyhouse farmers which were mainly due to three reason as given in Table 5.11. The table reveals that 33 percent reported deviations from the recommended design. The deviation was due to financial problems as reported by 73 percent of polyhouse owners. Twenty five percent respondents did it on the recommendations of the contractor who suggested it due to unsuitable shape of land on which the polyhouse was to be constructed. Eleven percent farmers just followed others.

Table 5.11. Reasons for Deviation From Recommended Design of Polyhouse

(%)

Equipments installed	Categories			All
	Small	Medium	Large	
Farmers reporting deviation	33	-	-	33
Reasons(Multiple Responses in %)				
Financial problems	73	-	-	73
Contractors' recommendations	25	-	-	25
Followed others	11	-	-	11

Sources of Training/Disseminations

5.14 There are various sources that provide the training to farmers related to protected cultivation. Majority of respondents had the training from more than one source, therefore the analysis in this respect is based on multiple response. Table 5.12 reveals that Horticulture Department was the main source of training of the majority (75%) of the farmers, followed by the source State Agricultural/Horticultural University (35%), Kisan Call Centre (20%). Input Dealers/Private Company Representatives (18%) Krishi Vigyan Kendras (15%) and Special Research Station (10%).

Table 5.12. Sources of Training/Dissemination Provided to Farmers for Protected Cultivation

(Multiple Responses in %)

Sources	Categories			All
	Small	Medium	Large	
1.State Horticulture Department	75	-	-	75
2.State Agricultural/Horticulture University	35	-	-	35
3.Krishi Vigyan Kendras	15	-	-	15
4.Kisan Call Centre	20	-	-	20
5.Cooperatives/Local Bodies	-	-	-	-
6.Input Dealers/Private Company Representatives	18	-	-	18
7.Spcial Research Stations set up by the Government	10	-	-	10
8.Non Government Organisations (NGOs)	-	-	-	-
9. Any Other	-	-	-	-

Cost of Construction of Polyhouse

5.15 The cost of construction of polyhouse basically depends upon the size and shape of polyhouse structure and type of polyhouse. Recently the polyhouse structure have been made possible on subsidized cost for vegetables and raising nursery successfully in abnormal weather conditions. The J&K government gives 80 percent subsidy to farmers for the construction of polyhouse and the farmers have to pay only 20 percent of the project cost. All the polyhouses in the sampled farmers were of simple type of polyhouse. The cost of construction of sampled polyhouses falling in the category of polyhouses of the size 250 sq.meter is given in Table 5.13. It can be seen from the

table that the total cost of polyhouse construction was Rs.15000 in which Rs.3000 was the net cost paid by the farmer and the rest Rs.12000 was the subsidy amount. In total cost, value of hired labour was Rs.3500(23.33%) and material cost Rs.11500 (76.67%). The most important component of total cost of construction was covering of polyhouse by polythene (Rs.13000) which is 86.67 percent of the total cost followed by land levelling and layout each (Rs.1000)

Table 5.13. Cost of Construction of Polyhouse (250m^2)

(Rs.)

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

Note. There were no polyhouse in categories of medium and large, consequently there are no tables numbered 5.14 to 5.15.

Loans for Construction of Polyhouses

5.16 The details of loans taken for the construction of polyhouses is given in Table 5.16. The table shows that out of total 100 sampled farmers 65 farmers have taken loans and

only from commercial banks. Loan for construction of polyhouses was required in the beginning, because the subsidy was paid after the completion of the construction of polyhouses. The average loan amount was Rs.15000 and the average outstanding amount was Rs.3961 which is very less as the average loan taken was also not high.

Table 5.16. Details of Loans for Construction of Polyhouses

(No.)

Particulars	**Categories**		
	Small	**Medium**	**Large**
Total number of farmers who took loan	65	-	-
1.Source of loan	-	-	-
- Commercial bank	65	-	-
- Cooperative bank	-	-	-
- Land development bank	-	-	-
- Government programme	-	-	-
- Traders/money lenders	-	-	-
- Aharti/commission agent	-	-	-
- Landloard/employer	-	-	-
- Friends/relatives	-	-	-
- Others	-	-	-
2. Amount of loan taken (Rs./person)	15000	-	-
3.Out standing amount (Rs./person)	3961	-	-

CHAPTER-6

Costs and Returns from Protected Crops

6.1 During the field survey (in the selected districts of Budgam and Srinagar), it was found that the sampled polyhouse farmers were raising only nursery inside polyhouses. Hence no off season vegetables were grown inside polyhouses. Therefore costs, returns and marketing of protected vegetable/flower crops could not be observed. Consequently there are no tables numbered 6.1 to 6.6. But by planting these seedlings in the open field, the yield is taken by the sampled growers of selected areas, so that a brief analysis of vegetables grown outside the polyhouse was carried out. It is pertinent to note here that there was only one category i.e. small of sampled farmers and hence there are no tables numbered 6.9 to 6.11.

Cropping Pattern

6.2 The cropping pattern (outside polyhouse) of the sampled growers is presented in Table 6.7. The table reveals that the crops grown in kharif season were cabbage, cauliflower and capsicum whereas in Rabi season cabbage, cauliflower and knolkhol were the crops grown by the sampled farmers. In kharif season, the area per farm was more (0.18 ha.) in cabbage followed by cauliflower (0.16 ha.) and capsicum (0.02 ha.). In Rabi season area per farm was maximum (0.17 ha.) in cauliflower followed by cabbage (0.15 ha.) and knolkhol (0.04 ha.)

Table 6.7 Cropping Pattern on Sampled Farms (Unprotected Cultivation)

(Area in Ha./farm)

Crops	Category			Overall
	Small	Medium	Large	
Kharif crops				
Cabbage	0.18	-	-	0.18
Cauliflower	0.16	-	-	0.16
Capsicum	0.02	-	-	0.02
Rabi crops				
Cabbage	0.15	-	-	0.15
Cauliflower	0.17	-	-	0.17
Knolkhol	0.04	-	-	0.04
Gross Cropped Area	0.74	-	-	0.74

Cost of Cultivation of Unprotected Crops

6.3 The cost of cultivation of important crops grown by the sampled farmers are presented in Table 6.8, wherein it can be seen that the cost of cultivation of cabbage, cauliflower, capsicum and knolkhol were Rs.49559, Rs.56156, Rs.46480 and Rs.48490 per hectare respectively. The cost of cultivation was maximum in the case of cauliflower and minimum in capsicum. The highest cost component in all the crops was manure followed by human labour except in the case of capsicum where the growers incurred maximum expenditure on human labour. The table also shows that there was no expenditure on irrigation and hired machinery in any of the crops.

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

Rs. /Ha.)

Cost Items	Crops			
	Cabbage	Cauliflower	Capsicum	Knolkhol
Seed	5797	7301	4750	6478
Manure	15398	19337	9000	12602
Fertilizer	5642	6732	5970	5654
Insecticides & pesticides	5630	6597	5530	6457
Irrigation	-	-	-	-
Hired machinery	-	-	-	-
Hired animal labour	5083	4550	4200	4934
Human labour	12009	11639	11500	12365
Total cost	49559	56156	46480	48490

Productivity of Crops

6.4 The productivity of crops grown under unprotected conditions is given in Table 6.12. The table shows that in kharif season the productivity was maximum (265 qtls./ha.) in cabbage followed by the productivity of cauliflower (255 qtls./ha.) and capsicum (245qtls/ha.). In Rabi season the productivity of knolkhol was found to be maximum (260 qtls./ha.) followed by the productivity of cabbage (250 qtls/ha.) and cauliflower (Rs.239 qtls./ha.).

Table 6.12. Productivity of Crops on Sampled Farms(Unprotected Cultivation)

(Quintals/Ha.)

Crops	Category			All
	Small	Medium	Large	
Kharif crops				
Cabbage	265.00	-	-	265.00
Cauliflower	255.00	-	-	255.00
Capsicum	245.00	-	-	245.00
Rabi crops				
Cabbage	250.00	--	-	250.00
Cauliflower	239.00	-	-	239.00
Knolkhol	260.00	-	-	260.00

Production of Crops

6.5 The production of crops per farm under unprotected conditions is presented in Table 6.13 The table reveals that in kharif season the production of cabbage per farm was maximum (48 qtls.) followed by cauliflower (41.69 qtls.) and capsicum (6.19 qtls.). Whereas in Rabi season the production of cauliflower per farm was maximum (41 qtls.) followed by cabbage (38 qtls.) and knolkhol (12 qtls.)

Table 6.13. Production of Crops on Sampled Farms (Unprotected Cultivation)

(Quintals/farm)

Crops	Category			Overall
	Small	Medium	Large	
Kharif crops				
Cabbage	48.99	-	-	48.99
Cauliflower	41.69	-	-	41.69
Capsicum	6.19	-	-	6.19
Rabi crops				
Cabbage	38.00	-	-	38.00
Cauliflower	41.00	-	-	41.00
Knolkhol	12.00	-	-	12.00

Value of Output

6.6 As can be seen from Table 6.14 that among the grown crops highest value per farm was observed in the case of cauliflower in both the seasons i.e. Rs. 83380 and Rs.82000 in kharif and rabi season respectively followed by cabbage (Rs.73485 and Rs.57000/farm), knolkhol (Rs.24000/farm in rabi season) and capsicum (Rs.13618/farm in kharif season).

Table 6.14. Value of Output From Crops on Sampled Farms (Unprotected Cultivation)

(Value in Rs/farm)

Crops	Category			Overall
	Small	Medium	Large	
Kharif crops				
Cabbage	73485	-	-	73485
Cauliflower	83380	-	-	83380
Capsicum	13618	-	-	13618
Rabi crops				
Cabbage	57000	-	-	57000
Cauliflower	82000	-	-	82000
Knolkhol	24000	-	-	24000

CHAPTER-7

Marketing System of Protected Crops

7.1 There were no crops grown inside polyhouses (except raising nursery of vegetables) in the sampled areas. Hence there was no marketing system of protected crops.

CHAPTER-8

Problems in Cultivation of Protected Crops

8.1 In this chapter, an attempt has been made to study the problems of vegetable growers raising nursery inside polyhouse.

Problems in Raising Nursery Inside Polyhouse

8.2 As far as the cultivation of off season vegetables is concerned, the sampled farmers of the selected areas of J&K raise only nursery inside polyhouses and grow vegetables outside polyhouse. But the farmers have many problems related to polyhouse construction and inputs availability. Majority of farmers faced more than one problem in all the aspects and hence, analysis of multiple responses has been used for this purpose.

Problems Faced in Construction of Polyhouse

8.3 The polyhouse growers of the selected areas were asked about the problems they faced related to construction schedule information, loans/subsidy clearance,

Table 8.1. Problems Faced in Construction of Polyhouse

(Multiple Response%)

Type of Problem	Category			Overall
	Small	Medium	Large	
Information not given clearly	60.00	-	-	60.00
Design	44.00	-	-	44.00
Long wait for loan clearance	30.00	-	-	30.00
Long wait for subsidy	64.00	-	-	64.00
construction	56.00	-	-	56.00

construction material etc. Sixty four percent complained about the clearance procedure of subsidy and thirty percent about the long wait for sanctioning of loan. Sixty percent farmers stated the problems in obtaining information about the time and cost schedule etc. of polyhouse construction. Forty four percent farmers were not happy with design of the polyhouse. Fifty six percent complained about use of inferior material in construction.

Problems Faced in Input Availability

8.4 Various problems like unavailability, higher prices and low quality of inputs were faced by the growers. Seventy six percent complained the problem of higher prices of inputs required for raising of seedling in a polyhouse. About fifty six percent reported unavailability of inputs and 74 percent told that the inputs were of low quality.

Table 8.2. Problems Faced in Input Availability

(Multiple Responses in %)

Type of problem	Category			Overall
	Small	Medium	Large	
Unavailability	56.00	-	-	56.00
Higher prices	76.00	-	-	76.00
Low quality	74.00	-	-	74.00

CHAPTER-9

Conclusions and Policy Implications

9.1 In Jammu and Kashmir State especially in Kashmir Division, horticulture plays a significant role in contributing to the development of the economy of the state. As per estimates, over 6 lac families are actively involved in horticulture sector. This sector is one of the most important employment generating sectors in the state. The growth of horticulture sector can be attributed to various initiatives taken by the GoI and State Govt; towards market interventions viz. establishment of fruit mandies, technological support, awareness options, publicity inputs, research extension etc. The area under vegetables and fruits in J&K has increased from 76.50 thousand hectares in the year 2005--06 to 100.7 thousand hectares in the year 2012-13.The state government has initiated protected farming through mission for integrated development of horticulture.

Main Findings

9.2 The greenhouse technology is still in its developing stage in the country, but In the sampled areas of J&K; it is in very primary stage and the polyhouses were generally less than 100 m^2. Farmers of J&K are facing several challenges such as small land holding, poor yields due to reliance on inefficient methods of farming, too much dependence on natural phenomena such as rainfall and lack of knowledge of modern methods of agriculture and above all of these lot of disturbances. Due to security reasons, it was difficult for the investigators to visit areas other than the selected areas to have an over view of the protected cultivation.

9.3 According to the data of the Directorate of Agriculture, Kashmir, Govt. of J&K the polyhouse farmers of the region were raising only nursery inside the polyhouses (no. 3575) and the nursery raised inside these polyhouses was planted in the area of 286.08 ha. with production of off season vegetables of 7120 MT. The same was observed in the sampled area.

9.4 The horticulture department was the main source of authentic and detailed information about the polyhouses. The friends & relatives, awareness camps and mass media were inspired the farmers to set up polyhouses. The decision making process of the farmers to adopt protected cultivation was influenced by variety of motivational factors and hindrances they encountered before setting up of polyhouses.

Most of the polyhouses were supervised by the department officers/officials whose attitude was very supportive towards the farmers. There were some deviations from the approved design of the polyhouses which were due to lack of funds.

9.5 As the sampled farmers were raising only nursery of vegetables inside polyhouse, therefore costs, returns and marketing of protected vegetable/flower crops could not be observed. However, a brief analysis of vegetables grown outside the polyhouse was carried out.

9.6 The crops grown in kharif season(outside polyhouse) were cabbage, cauliflower and capsicum whereas in Rabi season cabbage, cauliflower and knolkhol were the crops grown by the sampled farmers. In kharif season, the area per farm was more (0.18 ha.) in cabbage followed by cauliflower (0.16 ha.) and capsicum (0.02 ha.). In Rabi season area per farm was maximum (0.17 ha.) in cauliflower followed by cabbage (0.15 ha.) and knolkhol (0.04 ha.)

9.7 The cost of cultivation of cabbage, cauliflower, capsicum and knolkhol were Rs.49559, Rs.56156, Rs.46480 and Rs.48490 per hectare respectively. The highest cost component in all the crops was manure followed by human labour except in the case of capsicum where the growers incurred maximum expenditure on human labour. There was no expenditure on irrigation and hired machinery in any of the crops.

9.8 As far as the productivity of crops grown under unprotected conditions is concerned, in kharif season the productivity was maximum (265 qtls./ha.) in cabbage with total production 48 qtls./farm followed by the productivity of cauliflower (255 qtls./ha.) having total production 41.69 qtls./farm and the productivity of capsicum (245qtls/ha.) with total production 6.19qtls./farm. In Rabi season the productivity of knolkhol was found to be maximum (260 qtls./ha.) followed by the productivity of cabbage (250 qtls/ha.) and cauliflower (Rs.239 qtls./ha.). In Rabi season the production of cauliflower per farm was maximum (41 qtls.) followed by cabbage (38 qtls.) and knolkhol (12 qtls.)

9.9 Among the grown crops highest value per farm was observed in the case of cauliflower in both the seasons i.e. Rs. 83380 and Rs.82000 in kharif and rabi season respectively followed by cabbage (Rs.73485 and Rs.57000/farm), knolkhol (Rs.24000/farm in rabi season) and capsicum (Rs.13618/farm in kharif season).

9.10 Although the raising seedlings in polyhouses was found to be useful in producing off season vegetables outside polyhouses, the activity is not free from problems. In most of the cases execution of the polyhouse was delayed due to the long and cumbersome clearance procedure adopted by various departments for sanctioning polyhouse and clearance of loan & subsidy. The construction was further delayed by the contractor. Delay in technology transfer was another reason due to which the polyhouses could not become operational well in time. Once a polyhouse became operational, unavailability of inputs, higher prices or poor quality of inputs were the problems faced by farmers in raising nursery.

Policy Implications

9.11 The sampled farmers were raising only seedling inside polyhouses. However, the profitability from the polyhouses can be improved by taking the following steps.

- The cropping practices of crop production are significantly different in polyhouses than that of growing crops or vegetables outside the polyhouse. Polyhouse farming requires skill monitoring and care. Before polyhouses become operational, the growers should be given proper training related to cultural practices i.e. raising nursery and crops, intensity of irrigation, the most appropriate sowing and harvesting time.
- Inputs used in the polyhouses to raise the nursery should be provided to farmers through the department on subsidized rates. They should be provided best quality seeds at cheaper rates.
- Organic farming should be introduced and promoted in the polyhouses for healthy crop.
- Besides raising nursery, crops should also be grown in the polyhouses. But to do so the polyhouses of larger size should also be constructed.

REFERENCES

Bahirat, J.B. and Jadhav, H.G. (2011), "To study the cost, Returns and Profitability of Rose Production in Satara District", *The Asian Journal of Horticulture, Vol. 6, Issue 2, 311-315.*

Bhatnagar, P.R. (2015) "Strategies for Protected Cultivation for Small and Marginal Farmers in India" Article available on http://www.krishisanskriti.org/vol_image/

Brij Bala (2013), "Up liftment of Rural Economy Through Protected Cultivation", *Global Research Analysis, Vol. 2, Issue 2, 42-43.*

Chaudhary, A.K. (2016), "Scaling up of Protected Cultivation in Himachal Pradesh, India", *Current Science, Vol.3, No.2, 272-277.*

Cheema, D.S., Kaur P. And Kaur S. (2004), "Off Season Cultivation of Tomato under Net House Conditions", *Acta Hort. (ISHS) 659: 177-181*.

Dixit, A. (2007), "Performance of Leaf Vegetables Under Protected Environment and Open Field Condition*", Asian J. Hort., 2 (1): 197-200.*

Duhan Kumar Pardeep (2016), "Cost Benefit Analysis of Tomato Production in Protected and Open Farm*" International Journal of Advanced Research in Management and Social Sciences (IJARMSS), Vol.5, No.12, 140-148*.

Ganesan, M (1999), "Effect of Poly-Green house on Plant Micro Climatic and Fruit Yield of Tomato", M.S. Swaminathan Research Foundation, Tamil Naddu.

Ghanghas, B.S. and Mukteshwar, Rati (2015), "Protected Cultivation (Polyhouse) in Haryana. Problems and Prospects", *Indian Journal of Applied Research, Vol. 5, Issue 8, 684-685.*

Kouser Parveen Wani, Singh, P. Amin, A. Mushtaq F. And Dhar Z.A. (2011), "Protected Cultivation of Tomato, Capsicum and Cucumber Under Kashmir Valley Condition", *Asian Journal of Science and Technology, Vol. 1., Issue 4, 56-61.*

Kumar and Srivastava (1997), "Influence of Plastic Coverings on the Micro-Climate under Low Plastic Tunnels. *Veg.-Sci. 24 (2) 83-86.*

Kumar, Parveen, Chauhan, R.S. and Grover, R.K. (2016), "Economic Analysis of tomato Cultivation Under Polyhouse and open Field Conditions in Haryana, *Indian Journal of Applied and Natural Science 8 (2): 846-848.*

Murthy, D. S.; Prabhakar, B. S.; Hebbar, S. S.; Srinivas, V.; Prabhakar, M., "Economic feasibility of vegetable production under polyhouse: a case study of capsicum and tomato", *Journal of Horticultural Sciences 2009 Vol.4 No.2 pp.148-152 .*

Polyhouse Farming-Profits and Advantages (2015), Article available on http://www. Agri farming. In/polyhouse-farming-profits

Singh, B., Kumar, M. And Sirohi, N.P.S. (2007), "Protected Cultivation of Cucurbits Under Low Cost Protected Structures: a Sustainable Technology for Peri-Urban Areas of Northern Index", *Acta Hort. 731: 267-272.*

Singh, B and Sirohi NPS (2006), "Protected Cultivation of Vegetables in India: Problems and Future Prospects", *Acta Hort. (ISHS) 15 (2): 710: 339-342.*

Singh, R., Asray, R. (2005), "Performance of Tomato and Sweet Pepper Under Unheated Green house", *Haryana J. Hort. Sci. 34 (182): 174-175.*

Sphehia, R.S. (2015), "Status and Impact of Protected Cultivation in Himachal Pradesh, India", *Current Science, Vol. 108, No. 12.*

Sudhagar, S. (2013), "Production and Marketing of Cut Flower (Rose and Gerbera) in Hosur Taluk", *International Journal of Business and Management Invention, Vol.1, Issue 5, 15-25.*

Tarannum, Hemla Naik B. And Zaheer Ahamed, B .(2014), "Economic Feasibility and Profitability of Carnation Cultivation Under Protected Condition", *International Journal of Science and Nature, Vol.5(2): 283-286.*

Vaidya, C.S. and Singh Ranveer (2011), "Production and Marketing of Flowers and Vegetables under Protected Cultivation in Himachal Pradesh", Agro-Economic Research Centre, H.P. University, Shimla (Mimeo).

Reviewer's Comments

Title of the report:

An Economic Analysis of Protected Cultivation under MIDH in Jammu & Kashmir

Date of assignment received for review: April 19, 2017

Date of dispatch of the comments: April 29, 2017

Comments on the objectives of the study:

Objectives should be properly spelt out. The second and third objectives of the study have not been addressed to, due to non-availability of required information *i.e*. no crops were grown inside the polyhouse and the study was confined to growing of vegetable nursery only. Also, neither the economics were worked out in proper perspective, nor any market analysis was taken up.

It is being an individual study, and not a co-ordinated study, the objectives could have been redefined.

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

The following observations may perhaps be noted by the authors before finalizing the report.

(i) Is it necessary to work out the cropping pattern, production and productivity together with overall economics in open farms, especially when there were no such parameters recorded under polyhouse conditions (Chap 2, page 16).

(ii) Achievement in Table 3.2 may be shown in terms of percentage as well. Also, the units of rate of assistance and physical targets should specifically be spelt out. In Table 3.3, the units used against the column no. 3 (Rate of assistance) and 4 (Physical) may also be mentioned to bring in clarity.

(iii) In Table-4.2, absolute figures should also be recorded against different levels of education. The total members should invariably be 1038, and not 976. as indicated. The figure is not tallying with Tables 4. 3 and 4.4.

(iv) The entire area under consideration is reported to be irrigated, and as such, the cultivated irrigated land should possibly be 100 % instead of 37.32 % in Table-4.6.

(v) The figures in Table 5.5 are not in conformity with the text. These should accordingly be corrected against the construction material not locally available (31 instead of 33) and unsuitable farm location (25 instead of 24).

(vi) According to Table -5.6, 61 per cent farmers viewed that attitudes of the officials were supportive, but in analysis of the table, it was recorded as 57 per cent. The discrepancy should accordingly be removed.

(vii) It is not clear why the cost of construction of polyhouse was computed for a size of 250 m^2, when the size of the polyhouses in the study area were reported to be less than 100 m^2 (Refer page no 14).

(viii) Why should the farmers ask for a loan of Rs 15,000/- for construction of polyhouses when Government subsidy is reported to be Rs. 12,000/- (Tables 5.13 & 5.16). Also more explanation is required for the Table no. 5.16, wherein it was indicated that 65 per cent of the sampled farmers are availing loans from the Commercial Banks. Again, an outstanding amount of Rs. 3,961/- per person needs further clarifications.

(ix) The Table Nos. 5.14 and 5.15 are missing. Continuity of numbering the Tables may be maintained as there is nothing to depict through those Tables. The factual details may be mentioned in the text itself.

(x) The Chapter VI may be redesigned by

- Avoid repetition
- Maintain continuity of the Tables (Tables 6.1 to 6.6 and Tables 6.9 to 6.11)
- Follow proper cost structure and evaluate returns as per accepted norms
- Furnish the rationale behind taking up the costs for Cabbage, Cauliflower, Capsicum/Knolkhol only. Why not the other crops as mentioned in page 4 are

being considered?
- How can inference be drawn based on the cost/value of output calculated for unprotected cultivation only.
- Productivity (Table 6.12) should normally be computed from the production (Table 6.13) and Acreage (Table 6.7). May perhaps be re-checked and narration updated against point no. 9.6 in Chapter IX accordingly.

(xi) Chapter VII can simply be dropped as there is no protected cultivation outside the poly houses in the study area. But, what about the status of marketing of unprotected cultivation? (Reason being that production analysis has been undertaken for unprotected cultivation as well).

(xii) In Chapter VII, repetition should be avoided and inconsistencies removed. Also, the figures shown in Table 8.2 against input availability (Higher prices) is found to be different from the text, which may be rectified accordingly.

(xiii) Nowhere in the report, profitability has been dealt upon, and as such, all recommendations including policy implications (Chapter IX) should be based on the findings of the field survey/investigation only. Also, the Fourth Bullet under the Policy Implication is a mere repetition, which should be avoided.

(xiv) The draft report may be edited once again to avoid the common mistakes, compositional flaws and other inconsistencies.

Overall acceptability of the report:

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

Reviewer:
AERC, Jorhat
April 29, 2017

Action Taken Report

1. **Date of receipt of comments:** 29.04. 2017.

2. **Date of completion of final report:** 09.05. 2017.

Comments on the objectives of the study:
Being a coordinated study, objectives of this study were already finalized and there was no possibility of changing the objectives as the same studies were conducted in other two states. The second and third objectives of the study could not be achieved as vegetable/flower crops were not grown by the sampled farmers under protected conditions.

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

(i) This had to be done as it was a coordinated study.
(ii) –(vi) All suggested changes have been done and errors have been corrected.
(vii) This is because of the uniform classification of polyhouses followed in all the coordinated studies.
(viii) Loan for construction of polyhouses was required in the beginning, because the subsidy was paid after the completion of the construction of polyhouses. The explanation for the loan taken and outstanding amount is given in the text.

(ix) The Continuity of numbering the Tables cannot be maintained as this is a coordinated study. (the same is applicable in case of Tables 6.1 to 6.6 and Tables 6.9 to 6.11). The factual detail has been mentioned in the text.
(x) The costs and returns could not be calculated for protected crops, as there were no protected vegetable/flower crops grown by the sampled farmers .
The main crops grown by the sampled farmers in the open farms were Cabbage, Cauliflower, Capsicum/Knolkhol only. As there was no protected cultivation of vegetables/flowers (except raising of nursery), the cost/value of output was not calculated in details for open crops as the study was mainly confined to protected crops.
Productivity (Table 6.12) has been computed from the absolute figures of production and area.
(xi) Chapterization of the study is uniform with the other coordinated studies.
(xii) &(xiii) Needful done.
(xiv) The draft report has been edited.
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