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COST BENEFIT ANALYSIS OF TOMATO PRODUCTION IN PROTECTED AND OPEN FARM

Dr. Pardeep Kumar Duhan, Assistant Professor in Economics, Government College for Women, Mokhra (Rohtak)

Abstract: *Vegetable production in poly house can reduce the amount of water and chemicals used in production and also produce bumper production of vegetables compared to open field conditions. An attempt has been made in the study to examine the comparison of economic benefits to farmers for production of tomato in poly house and open farm. The present study was based on primary as well as secondary data. Equal number of farmers (for both poly house and open farm) has been interviewed with the help of pre-tested structured questionnaire. The study concludes that the production cost and production were higher in poly house as compare to open farm. Moreover, the production of tomato was more than three times in poly house as compare to open farm. Moreover the market price of tomato that produces in poly house was higher than the tomato produce in open farm. In long run poly house seems more economic as poly house production earn more than ten time benefit to the farmers as compare to open farm farmers. There were some significant limitations also in poly house farming.*

Keywords: *Poly house, Protected farm, Open farm, Benefit, Production, Cost*

INTRODUCTION

In north India, winter season and other climatic conditions are not favorable for vegetables production in off season. Thus, these conditions result scare supply of vegetables and caused demand pull inflation. It was found in last decade that vegetable price contribute maximum in inflation of food items and fetch the attention of policy makers to sought out this problem. However various types of protected structures have been developed for growing maximum production crops continuously by providing protection from the harsh climatic conditions of vegetables production. The main purpose producing vegetable in protected structure is to get higher profit and disease free seedlings in off season to raise early crop in protected condition as compare to open field condition. Further it was found during pilot survey and published reports that Poly house was became famous among farmers out of all protected method of farming.

The poly house (Protected Farm) is generally covered by transparent or semi transparent material with plastic or plastic thinner. Basically poly house covered with simple plastic sheet. They generally reflect back about 49% of net solar radiation. With the optional slots of net window in poly house which help to maintain the inside temperature of poly house. These objects in turn emit long wave thermal radiation in the infra red region for which the glazing material has lower transparency. The temperature regulation in the structure is very precise and is linked to ambient temperature so that desired difference between the temperature inside and outside the structure is maintained in diurnal cycle during high-temperature treatment. The temperature controlling system is helpful to grow the plan. (National Horticulture of India, annual report 2014-15 on covered farming pp 112-124).In poly house a farmer can grow tomato capsicum, cucurbits, French bean and cucumber. For the research paper tomato has been selected as tomato is the most common vegetable with multipurpose uses.

Tomato belongs to the genus Lycopersicon under Solanaceae family. Tomato is one of the most important "protective foods" because of its special nutritive value. It is one of the most versatile vegetable with wide usage in Indian culinary tradition. Tomatoes are used for soup, salad, pickles, ketchup, puree, sauces and in many other ways it is also used as a salad vegetable. Tomato has very few competitors in the value addition chain of processing. Tomato is the world's largest vegetable crop after potato and sweet potato, but it tops the list of canned vegetables. The total global area under tomato is 46.16 lakh ha and the global production is to the tune of 1659.93 lakh tones (**Global vegetable production- report by Dept. of horticulture India (20013-14)**.

REVIEW OF LITERATURE

Keeping the importance of subject matter in view many researchers and scholar examines and conduct many studies time to time. Sanjeev K., Patel N.B., Saravaiya S.N. and Desai K.D. (2013-14) conducted a study “Economic viability of cucumber cultivation under NVPH’’ which concluded that cost of fixed components and selling rate of produce were the two important factors. Uncertainty factor can also be handled smartly through a cluster approach by farmers. Parveen kumar, R.S. Chauhan and R.K. Grover (2012-13) examined “Comparative economics of cucumber cultivation under poly houses and open field conditions in Haryana’’. The study conclude that the cost of cultivation of cucumber under

poly houses was higher compared to open field conditions and cucumber cultivation under poly houses has significantly contributed to the yield. Dr. Reena Nair Dr. Swati Barche (2013-14) studied "Protected Cultivation of Vegetables – Present Status and Future Prospects in India''. In their study concluded that the greenhouse technology is still in its preliminary stage in India and concerted efforts are required from all concerned agencies to bring it at par with the global standards. Economically viable and technologically feasible greenhouse technology suitable for the Indian agro-climatic and geographical conditions is needed at the earliest. Udit kumar and Girish Chandra (2013-14) in their study "Effect of spacing and training levels on growth and yield of capsicum under poly house conditions in North-Bihar'' highlighted that poly house of four slot was more profitable as compare to single poly house.

The present study has made an attempt to examine the comparative economics of tomato under poly houses and open field conditions in Haryana.

OBJECTIVE

I. To compare the cost and production of tomato inside the poly house and open farm.
II. To highlight the some limitation and other advantage of poly hose.

RESEARCH METHODOLOGY

The study was based on primary as well as secondary data. Secondary data regarding the number of poly house and patterns was collected from different published and unpublished sources. Primary data was collected from farmers through a pretested scheduled questionnaire. A multi-stage sampling technique was used for select the farmers. On the first stage Sonipat district was selected randomly after that Gannaur block has been selected randomly. A total number of 20 farmers for poly house and 20 farmers for open field tomato grower have been interviewed.

For measuring the cost, production and revenue a time period of one year has been taken for both in poly house and open field operation.

The researcher tried hard to find out same soil condition and same quality of water for irrigation for both poly house and open field. That justified the comparison in better manners.

Median-

{value of (n/2) th term + value of (n/2+1)}/2

Collected data was in tabular form and simple statistical tools like average, median and percentage method has been used.

Limitation and problems faced by the respondent farmers in tomato production under greenhouse condition were ascertained by conducting opinion survey regarding the marketing and production related constraints.

Section I

In this section, the researcher examined the cost, production and benefit comparison of tomato between poly house and open farm. Median technique has been used to simplify the data (collected from all the selected respondents). Share of different cost variable in total cost is explained with the help of Percentage method.

Table 1.1

Comparison of cost of tomato production in Poly house and Open field Farming

(Cost in Rupees per acre in a year)

Sr. no.	Production and marketing cost variable	Poly house	Open farm
1.	Field preparation and cultivation	6000 Rs./per acre (2.86 % of total cost)	6500 Rs./per acre (4.74% of total cost)
2.	Seed	20000 Rs./per acre (9.55 % of total cost)	20000 Rs./per acre (14.59% of total cost)
3	Fertilizers	22000 Rs./per acre (10.5 % of total cost)	4000 Rs./per acre (2.91% of total cost)
4	Irrigation	4000 Rs./per acre (1.91 % of total cost)	5500 Rs./per acre (4.01% of total cost)
5	Plant protection	3400 Rs./per acre (1.62 % of total cost)	8000 Rs./per acre (5.83% of total cost)
6	Rental value of land per year	35000 Rs./per acre (16.71% of total cost)	35000 Rs./per acre (25.53% of total cost)
7	Total labor charge including harvesting and care taking	80000 Rs./per acre (38.2 % of total cost)	42000 Rs./per acre (30.65% of total cost)
8	Marketing cost (transportation, packaging, loading and unloading etc.)	39000 Rs./per acre (18.6 % of total cost)	16000 Rs./per acre (11.67% of total cost)
9	Total production and marketing cost	209400	137000

Source- Primary survey

Table 1.1 explains the Cost comparison of tomato production in Poly house and Open field Farm. The median value of cost per year is mentioned in the table. Total cost of production and marketing is dividing into ninth parts for the both. Table depicts that Field preparation

and cultivation cost (per acre) Rs. 6000 and Rs.6500 in poly house and open farm respectively. Seed cost equal for both. Further we can see a big difference in cost of fertilizer as it cost Rs.22000 in poly house and it was only Rs.4000 in open farm. Such a huge difference in fertilize cost is due to the use of unusual fertilizers i.e. Potassium Nitrate, Potassium Sulphate and Monophosphate. Which are totally imported and unsubsidized. Irrigation charges were 4000 and Rs. 5500 for poly house and open farm respectively. The cost of plant protection charge higher in open field as it was Rs.8000 in open field and Rs.3400 in poly house. As mentioned above that researcher sampled the equal location and quality land for the both as their rental chares per year were same it was Rs.35000 per year. Moreover table shows that there was a big difference in labor cost and marketing cost. The labour costs in poly house and open farm are Rs. 80000 and Rs.39000 respectively. This difference is due to heavy use of labour(for spraying, loading, unloading, packaging and harvesting) in poly house everyday and which is not used in open farming extensively. The marketing cost in poly house and open farming is Rs.39000 and Rs. 16000 respectively. In case of total cost table shows that it was Rs.209400 per year and Rs. 137000 per year for poly house and open farm respectively. Moreover the table explain percentage share of different cost variable in total cost. In case of Poly house share of labor cost was high followed by marketing cost, rental value of land, fertilizer cost, seed cost, field preparation and irrigation. Where in case of open farm labor cost share high followed by rental cost, seed cost, marketing cost, plant protection, field preparation, irrigation, and fertilizers. We can conclude that irrigation cost share less in total cost in poly house and fertilizers cost share less in total cost in case of open farm. The cost of labor was higher in total cost in the both fields.

COST BENEFIT ANALYSIS

Cost Benefit analysis is the comparison of total cost and total revenue. The difference between total revenue and total cost termed as total benefit.

Benefit = Total revenue – Total cost.

Table 1.2 shows that total production of tomato in poly house was 35000 kg in a year, where it was marketed at an average price of Rs.24/kg. Farmers fetched a total revenue of 840000 Rs. After the deduction of total cost from total revenue we calculate the benefit i.e. Rs.630600 per acre in a year. In case of open farm the total production of tomato in open

farm was 11000 kg in a year, where it was marketed at an average price of 16 Rs./kg. Farmers earned total revenue of Rs.176000 After the deduction of total cost from total revenue we can calculate the benefit i.e. Rs.39000/per acre in a year.

Table 1.2

Cost Benefit Analysis

	Poly house	Open field
Total production in a year	35000 kg/per acre	11000 kg /per acre
Average market selling price	Rs.24/Kg	Rs.16/Kg
Total Revenue per year	Rs.840000/per acre	Rs 176000 /per acre
Total cost per year	Rs.209400/per acre	Rs.137000 /per acre
Total benefit in a year	Rs.630600/per acre	Rs.39000/per acre

Source- Primary survey

The above table elaborates that the production of tomato was more than three times in poly house as compare than that of open farm. Moreover the market price of tomato that produces in poly house was higher than the tomato produce in open farm. Consumers of tomato reported health reasons for the price difference i.e. they found poly house production is more hygiene as compare to open farm produce tomato.

Total benefit in long run

It may be noted during survey that installment cost of poly house was not include in total production and marketing cost. It was found that on an average installment cost was 1200000 Rs. per Acer where there was no installment cost in open farm for the production of tomato.

Table 1.3

Cost Benefit Analysis in Long run

	Poly house	Open farm
Total benefit of one year	630600 Rs.	39000 Rs.
Approx. Benefit in Five year	630600*5= 3153000 Rs.	39000*5= 195000 Rs.
Benefit including instatement cost	3153000-1200000=1953000 Rs.	195000 – 0 = 195000 Rs.

Source- primary survey

However an attempt has been to examine the cost benefit of both for the time of five year in the table 1.3. Table indicate that producer of tomato can earn Rs.3153000 from poly house as the amount in open farm was just Rs.195000 further if deducted installment cost of poly house from approx benefit of poly house in five year than we found that a producer

can earn more than ten time as compare to open farm in long run too. (Annual return was assumed on the basis of survey year production and cost, that is a subject of ceteris peribus)

Section II

LIMITATION AND OTHER BENEFIT OF POLY HOUSE

Other benefits which was reported by farmers and consumers are as follows-

1. Tomato production in poly house can reduce the amount of water and chemicals used in production of high value vegetables compared to open field conditions.
2. Multiple cropping on the same piece of land is possible.
3. Production of high quality and healthy seedlings of vegetables for transplanting in open field supporting early crop, strong and resistant crop stands.
4. It makes cultivation of vegetables possible in areas where it is not possible in open conditions such as high altitudes, deserts.
5. Controlled environmental conditions are used for early rising of nurseries, off-season production of vegetables and seed production. Management and control of insect-pests, diseases and weeds is easier.

Limitation of production under Poly House

During the field survey it was found that there were major limitations of poly house.

1. As we concluded from above study that poly house was more economic and beneficial for farmers. Then why they are not in common prevalence ? The answer was found during the study an approximately cost of poly house installation was Rs. 1200000 for one acre. That cannot be afforded by 80% of farmers as they belong to small, marginal or medium categories. On other side government offer heavy subsidy (about 40 to 60 %) on their installation but still due to the heavy paper work and financial problems farmer avoid to install playhouse.
2. Another limitation was that due to the bumper production of product marketing of that particular product became headache as lack on heavy demand in small cities.
3. Heavy dependence on imported and unsubsidized fertilizers also hinders the growth of poly houses.
4. Finally in the conversation with the farmers it was also noticed that the problem of outside protection of poly house also a major limitation. As the outer layer of poly

house is prepared by thinner plastic that can easily harmed by animals and that is also heavily inflammable.

CONCLUSION

The study concluded that in Poly house share of labor cost was high followed by marketing cost, rental value of land, fertilizer and seed cost, field preparation and irrigation. Where in case of open farm labor cost share high followed by rental cost, seed cost, marketing cost, plant protection, field preparation, irrigation, and fertilizers. We can conclude that irrigation cost share less in total cost in poly house and fertilizers cost share less in total cost in case of open farm. The cost of labor was higher in total cost in the both fields.

From the above result we can concluded that the production of tomato was more than three times in poly house as compare to open farm. Moreover the market price of tomato that produces in poly house was higher than the tomato produce in open farm. Consumers of tomato reported health reasons for the price difference i.e. they found poly house production is more hygiene as compare to open farm produce tomato. In case of long run profit after including the instatement cost of poly house study concluded that in long (time of five year) producer of poly house can earn ten times more as compare to open farm producer.

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