

**RESEARCH ARTICLE**

**Constraints Faced by the Protected Growers of Himachal Pradesh**

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**ABSTRACT**

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The present study was conducted to analyze the constraints faced by protected vegetable growers of Himachal Pradesh. A sample of 240 respondents was chosen randomly using multistage random sampling from the mid-hill zone of Himachal Pradesh. The problems were analyzed using garret ranking and Chi-square test. Garret ranks showed that the main problems were lack of storage facility, inability to reap benefits of subsidies, and unavailability of plant protection chemicals and plant material. In Chi-square, the significant problems were inability to reap benefits of subsidies (7.39), lack of awareness about seed and plant treatments (6.28), unavailability of technical knowhow (6.02), and lack of storage facility (6.24). The precautionary steps to be taken care of during protected cultivation of crops include use of well-decomposed FYM, less frequent opening and closing of doors, soil treatment, and use of virus-free seeds. A proper knowhow and awareness among farmers can help in achieving sustainability through protected cultivation of crops.

**Key words:** Chi-square, constraints, garret ranking, protected cultivation

**INTRODUCTION**

Agriculture holds a paramount position in India's economy, supporting a significant portion of its populace and contributing substantially to the GDP. The sector's importance is deeply rooted, providing livelihoods primarily in rural areas, ensuring food security, and maintaining price stability. India stands as a global leader in the production of various agricultural commodities, such as rice, wheat, sugarcane, cotton, pulses, fruits, and vegetables. The nation's diverse agro-climatic regions facilitate the cultivation of a wide array of crops. However, the agricultural landscape in India is not without its challenges. A significant number of farmers own small landholdings, hampering the adoption of modern practices. Despite potential, productivity remains hindered by outdated methods, limited

technology access, and inadequate infrastructure. Water management issues persist, encompassing scarcity and inefficient usage. Market accessibility problems lead to price fluctuations and income uncertainty for farmers. Furthermore, climate change-induced erratic weather patterns jeopardize yields and livelihoods. Debt and financial stress are recurring issues, often stemming from crop failures and unstable market prices. To address these challenges, the Indian government has introduced various schemes and initiatives encompassing input subsidies, crop insurance, protected cultivation, and measures to promote sustainable agricultural practices.

Protected cultivation, commonly referred to as greenhouse farming or sheltered horticulture, is a contemporary agricultural method involving the cultivation of crops within enclosed structures like greenhouses or polyhouses. This technique creates a controlled environment where elements such as temperature, humidity, light, and airflow can be adjusted to optimize plant growth conditions.<sup>[2]</sup> By

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safeguarding plants from adverse weather conditions, pests, and diseases, protected cultivation extends the growing period and augments crop yields. In addition, this practice encourages responsible water usage, facilitates diverse crop production, and guarantees the consistent supply of high-quality produce. Although energy consumption may be a factor, the advantages of protected cultivation, including reduced reliance on pesticides and efficient land utilization, underscore its significance in tackling the challenges of modern agriculture. In India, protected cultivation is gaining traction, particularly for high-value crops, presenting a sustainable and technology-driven avenue to elevate agricultural productivity. In the modern landscape of agriculture, the practice of protected cultivation has risen as a symbol of innovation, granting cultivators the power to meticulously manage their growing conditions. However, within the realm of its advantages, there lies a realm of challenges. This article delves into the intricacies of constraints that protected cultivators confront as they strive to unlock the full potential of controlled environments. From technological limitations that require solutions to economic factors that demand consideration, this piece explores the multifaceted challenges that necessitate both attention and inventive resolutions. By unraveling the constraints faced by these determined cultivators, we gain profound insights into the evolving agricultural sphere and the necessary steps to facilitate a smoother journey for them.

## MATERIALS AND METHODS

To meet the objective of the study, both primary and secondary data were collected. Primary data were collected on a pretested schedule by personal interview method from the selected respondents on different aspects of vegetable growers. The schedule was then modified and finalized for the main survey.

### Methods of Data Analysis

Problems faced by the farmers practicing protected cultivation in the study were analyzed using Garrett's ranking and Chi-square methods.<sup>[3]</sup> To study the various problems associated with the cultivation

and marketing of vegetable crops, it was assumed that the extent of a particular problem varies from place to place and grower to grower. The multiple responses of producers reporting various problems were taken into consideration for analysis.<sup>[4,5]</sup>

### Garrett's method of ranking

In this method, the constraints were focused on the response of all sample farmers. The respondents were asked to rank the problems related to production, processing, and marketing. It was used to study the growers' problems toward the climate change with the following:

$$\text{Percent position} = \frac{(R_{ij} - 0.5)}{N_j}$$

Where:

$R_{ij}$  = Rank given to  $i^{\text{th}}$  position by the  $j^{\text{th}}$  individual

$N_j$  = Numbers of problems ranked by  $j^{\text{th}}$  individual

From Garrett's Table, the estimated percentage positions were converted into scores. Thus, for each constraint, the scores of the various respondents were added and the mean values were computed. The resultant mean values for each of the attributes were arranged in descending order. The attributes with the highest mean value were considered as the most important one and the others followed in that order till the last one.

### Chi-square test

To test whether there is any significant difference among different categories of vegetable growers for the problems faced by them, Chi-square test in  $m \times n$  contingency table was applied where  $m$  and  $n$  are the number of marketing problem faced by the farmers.<sup>[8,9]</sup>

The detail of approximate Chi-square test ( $\chi^2$ ) is given as under:

$$\chi^2 = \sum_{j=1}^L \sum_{i=1}^K \frac{(O_i - E_i)^2}{E_i} \sim X^2(L-1)(K-1) \text{ d.f.}$$

Where,

$O_i$  = Observed frequency

$E_i$  = Expected frequency

$K$  = number of problems

$L$  = number of farm size groups.

**Table 1:** Farmers' Perception and Problems faced by protected vegetable growers

Sr. No.	Problem/constraint	Garret's score	Percent	Rank
1	Lack of storage facility to the produce	1320	9.57	I
2	Unable to reap the benefits of subsidy on various inputs	1220	8.84	II
3	Unavailability of improved plant protection chemicals at local markets	1175	8.51	III
4	Absence of assured marketing at remunerative prices	1152	8.35	IV
5	Lack of regulation and manipulation by merchants	1129	8.18	V
6	Lack of awareness about seed and plant treatments	1006	7.29	VI
7	Lack of better transportation facility	997	7.22	VII
8	Unavailability of exact technical knowhow	996	7.22	VIII
9	Higher cost of recommended inputs	873	6.33	IX
10	Lack of knowledge about post-harvest technologies	826	5.99	X
11	Lack of awareness about using type of varieties	763	5.53	XI
12	Lack of skills about operating implements and equipments	724	5.25	XII
13	Higher electricity cost	606	4.39	XIII
14	Lack of irrigation water	600	4.35	XIV
15	Higher cost of replacing the material of polyhouse (sheets, drip channels, etc.)	413	2.99	XV

## RESULTS AND DISCUSSION

### Garret Ranking Technique

It could be concluded from Table 1 that the five major problems were “Lack of storage facility” (I) with a garret mean score 9.57%, followed by “Unable to reap the benefits of subsidy on various inputs” (II) with a score of 8.84, “Unavailability of improved plant protection chemicals at local markets” (III) with a score of 8.51, “Absence of assured marketing at remunerative prices” (IV) with a score of 8.35 and “Lack of regulation and manipulation” by merchants (V) scoring 8.18. Other problems faced by the protected cultivation growers in the study area were “Lack of awareness about seed and plant treatments” (VI), “Lack of better transportation facility” (VII), “Unavailability of exact technical knowhow” (VIII), “Higher cost of recommended inputs” (IX), “Lack of knowledge about post-harvest technologies” (X), and “Lack of awareness about using type of varieties” (XI). The least occurring problems faced in study area were “Lack of skills about operating implements and equipments” (XII), “Higher electricity cost” (XIII), “Lack of irrigation water” (XIV), and “Higher cost of replacing the material of polyhouse (sheets, drip channels, etc.)” (XV).

### Chi-square Test

Chi-square test is utilized to identify main problems, multiple response within category farms, significant

problems showed that a problem response within the category was quite different, whereas, non-significant problems implied that farmers' response to a challenge within the category is almost similar.<sup>[7,8]</sup> The results of Chi-square test have been presented in Table 2. The problems faced by the farmers have been classified as problems related to labor, fertilizer, plant protection, others, and marketing.

### Input constraints

From Table 2, it can be inferred that the main problem found was unavailability of improved plant protection chemicals at local markets; this problem had the higher response in the small size polyhouses category (39.45%) and the lower response in the medium size polyhouse category (26.87%). There is one more problem of unavailability of healthy plant material in the study area, as reported by small size polyhouse category (31.87%), followed by large size polyhouse category (25.00%) and medium size polyhouse category (23.88%). In the study area, large size polyhouse category faced the problem of higher cost of replacing the material of polyhouse (26.92%) more than medium (24.63%) and small size polyhouse category (17.58%). The significant constraint among input constraints was being unable to reap the benefits of subsidy on various inputs.

### Financial constraints

Among the financial constraints, the high cost of improved varieties was the main constraint (43.80%)

**Table 2:** Farmers' Perception and Problems faced by protected vegetable growers (Multiple response, %)

S.N.	Problems	Farm size (m <sup>2</sup> )			Overall	Chi-square
		Small (250 m <sup>2</sup> )	Medium (500 m <sup>2</sup> )	Large (1000 m <sup>2</sup> )		
	No. of farmers	52	48	20	45.07	100
A.	Input constraints					
1	Higher cost of replacing the material of polyhouse (sheets, drip channels, etc.)	0.31 (17.58)	0.69 (24.63)	0.70 (26.92)	0.53 (21.96)	2.06
2	Unavailability of improved plant protection chemicals at local markets	0.73 (41.76)	0.75 (26.87)	0.75 (28.85)	0.74 (33.65)	4.03
3	Unable to reap the benefits of subsidy on various inputs	0.15 (8.79)	0.69 (24.63)	0.50 (19.23)	0.43 (16.87)	7.39*
4	Unavailability of healthy plant material	0.56 (31.87)	0.67 (23.88)	0.65 (25.00)	0.62 (27.53)	1.39
	Total	1.75 (100.00)	2.79 (100.00)	2.60 (100.00)	2.31 (100.00)	
B.	Financial constraints					
1	High cost of improved varieties	0.60 (46.97)	0.75 (41.38)	0.60 (41.38)	0.66 (43.80)	0.48
2	Higher electricity cost	0.40 (31.82)	0.75 (41.38)	0.55 (37.93)	0.57 (36.66)	1.27
3	High cost of equipments and material for constructing and operating polyhouses	0.27 (21.21)	0.31 (17.24)	0.30 (20.69)	0.29 (19.54)	0.47
	Total	1.27 (100.00)	1.81 (100.00)	1.45 (100.00)	1.52 (100.00)	
C.	Other constraints					
1	Limited supply of FYM	0.88 (39.32)	0.75 (30.77)	0.90 (38.30)	0.83 (35.73)	1.21
2	Lack of irrigation water	0.75 (33.33)	0.85 (35.04)	0.60 (25.53)	0.77 (32.72)	1.64
3	Lack of confidence of using new techniques	0.62 (27.35)	0.83 (34.19)	0.85 (36.17)	0.74 (31.56)	1.31
	Total	2.25 (100.00)	2.44 (100.00)	2.35 (100.00)	2.34 (100.00)	
D.	Technical constraints					
1	Lack of knowledge about post-harvest technologies	0.21 (18.97)	0.21 (27.03)	0.20 (21.05)	0.21 (22.54)	1.57
2	Lack of awareness about seed and plant treatments	0.42 (111.54)	0.13 (77.08)	0.25 (95.00)	0.28 (95.00)	6.28*
3	Unavailability of exact technical knowhow	0.17 (15.52)	0.19 (24.32)	0.10 (10.53)	0.17 (18.21)	6.02*
4	Lack of awareness about using type of varieties	0.31 (27.59)	0.25 (32.43)	0.40 (42.11)	0.30 (31.94)	3.21
	Total	1.12 (100.00)	0.77 (100.00)	0.95 (100.00)	0.95 (100.00)	
E.	Marketing problems					
1	Absence of assured marketing at remunerative prices	0.35 (11.11)	0.54 (16.15)	0.15 (3.90)	0.39 (11.92)	7.30
2	Lack of storage facility to the produce	0.17 (5.56)	0.40 (11.80)	0.65 (16.88)	0.34 (9.94)	6.24*
3	Lack of insurance facilities	0.50 (16.05)	0.58 (17.39)	0.55 (14.29)	0.54 (16.29)	0.30
4	Delay in payments	0.46 (14.81)	0.52 (15.53)	0.55 (14.29)	0.50 (15.01)	0.05
5	Lower prices at harvest	0.33 (10.49)	0.25 (7.45)	0.30 (7.79)	0.29 (8.83)	0.65
6	Lack of better transportation facility	0.27 (8.64)	0.25 (7.45)	0.50 (12.99)	0.30 (8.89)	1.75
7	Unavailability of buyers at near markets	0.56 (17.90)	0.42 (12.42)	0.60 (15.58)	0.51 (15.32)	0.99
8	Distant markets	0.48 (15.43)	0.40 (11.80)	0.55 (14.29)	0.46 (13.79)	0.50
	Total	3.12 (100)	3.35 (100)	3.85 (100)	3.33 (100.00)	

among all problems related to finance. Significant issues related to fertilizers found in the study area were higher electricity cost (36.66%) and high cost of equipments and material for constructing and operating polyhouses (19.54%).

#### **Other constraints**

There were some other problems faced by the protected vegetable growers of the study area

such as limited supply of FYM (35.73%), lack of irrigation water (32.72%), and lack of confidence of using new techniques (31.56%).

#### **Technical constraints**

There were many constraints related to the technical aspects of the protected vegetable growers in the study area. Lack of awareness about seed and plant treatments (95.00%) and unavailability of exact



**Table 3:** Precautionary steps taken inside the polyhouse units to check diseases and pests (Percent respondents)

Sr. No.	Precautions taken	Aware farmers			Small			Aware farmers			Medium			Aware farmers			Large			Aware farmers			Overall		
		A	O	N	A	O	N	A	O	N	A	O	N	A	O	N	A	O	N	A	O	N			
1	Use of disinfectants while entering the polyhouse	52	11	36	53	64	28	52	20	68	22	32	46	59	20	42	39								
2	Avoiding yellow shirts/cloths	78	15	75	10	84	20	65	15	88	26	38	36	82	19	65	16								
3	Opening and closing doors less frequently	100	20	80	0	90	28	52	20	98	35	42	23	96	26	62	12								
4	Yellow sticky traps are installed between two doors	50	8	50	42	52	12	34	54	56	12	42	46	52	10	42	47								
5	Well-decomposed FYM is used	100	79	21	0	94	35	37	28	100	78	22	0	98	61	28	11								
6	Training/pruning done with secateurs	40	15	30	55	52	14	36	50	60	14	46	40	48	14	35	51								
7	Virus-free seed is used	54	18	42	40	58	16	35	49	62	18	44	38	57	17	40	43								
8	Biological controls (traps, predators, and parasitoids) are preferred	44	22	38	40	50	15	38	47	64	18	48	34	50	19	40	42								
9	Soil is treated after every 3 years	78	20	52	28	83	24	38	38	92	42	45	13	82	25	45	30								
10	Visitors are not allowed to carry unnecessary bags, eatables, etc.	85	22	63	15	86	28	35	37	88	25	44	31	86	25	49	26								

technical knowhow (18.21%) were the significant technical constraints faced by the vegetable growers.

### Marketing problems

There were many problems related to marketing of vegetables grown by protected cultivation such as absence of assured marketing at remunerative prices (11.92%), lack of storage facility to the produce (9.94%), lack of insurance facilities (16.29%), delay in payments (15.01%), lower prices at harvest (8.83%), lack of better transportation facility (8.89%), unavailability of buyers at near markets (15.32%) and distant markets (13.79%). The significant constraints among these were lack of storage facility to the produce.

### Figures in Parenthesis Represent the Percentage to the Total

#### Precautionary steps taken by the polyhouse growers

Table 3 revealed that the farmers were aware about various precautionary steps followed, yet only few of the farmers always followed those steps while the others followed the steps either occasionally or never. For example, at overall basis, about 98% farmers were aware that well-decomposed FYM must be used but only 61% of them always followed this precaution, 28% followed it occasionally and 11% never followed it. In case of precaution related to opening and closing of doors less frequently,

only 26% followed this precaution always, 62% followed it occasionally and 12% never followed this precautions. The precautions like Yellow sticky traps are installed between two doors (52%), training/pruning done with secateurs (48%), use of virus free seeds (57%), and preferable use of biological trap (50%). In all these cases, the majority of farmers were not aware. Therefore, the farmers need to be made aware about all the precautionary practices and advised to use these practices sincerely.

### CONCLUSION

There were many problems faced by the vegetable cultivators of the area. The major problems among those were lack of storage facilities, unable to reap the benefits of subsidy, unavailability of improved plant protection chemicals at local markets, whereas, minor problems were lack of skills, higher electricity cost, lack of irrigation water, and higher cost of replacing the polyhouse material. The precautionary steps in protected cultivation of crops include use of well-decomposed FYM, less frequent opening, and closing of doors, visitors are not allowed to carry unnecessary bags, etc., soil treatment, use of virus-free seeds, etc., a proper knowhow and awareness among farmers can help in achieving sustainability through protected cultivation of crops.

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