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PROTECTED CULTIVATION OF CUCUMBER IN MID HILL ZONE OF HIMACHAL PRADESH: SOCIO ECONOMIC AND CONSTRAINT ANALYSIS

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Abstract

Vegetable cultivation under protected cultivation involves growing vegetables in controlled environments like polyhouses etc. This method shields plants from adverse weather conditions, pests, and diseases, allowing for extended growing seasons and better control over the environment. It offers higher yields and better quality produce compared to open-field cultivation. Protected cultivation is widely used worldwide and is especially valuable in regions with harsh climates or limited growing seasons. It is a crucial practice in modern agriculture for ensuring consistent and reliable vegetable production. The objective of this study is to discuss the socio economics status of cucumber, economics of protected cultivation technology and problems faced by the growers in mid hill zone of Himachal Pradesh. Simple random sampling was done and primary as well as secondary data were collected from various agencies. The polyhouses were of three sizes, upto 252 m^2, 252 - 500 m^2 and 501-1000 m^2 and computations were made for various aspects. In the study area, the average family size and literacy rate were found to be 4.85 members and 88.75 per cent respectively. The Costs A_1, B_2, and C_3, at an overall level for polyhouses of size upto 252 m^2 were ₹ 42854.22, ₹ 45638.49 and ₹ 54965.38 respectively, according to the table. For polyhouses of sizes 252-500 m^2, the Costs A_1, B_2, and C_3 were ₹ 104869.36, ₹ 114685.12 and ₹ 139365.42 respectively. However, for 501-1000 m^2 sized polyhouses, the Costs A_1, B_2, and C_3 were ₹ 142789.66, ₹ 151628.42 and ₹ 183603.17 respectively. The main problems faced were unavailability of healthy planting material (26.87%), higher cost of replacing material (24.63%), unavailability of local market (24.63%) and lack of technical knowhow & high transportation cost (23.88%).

Keywords: Cucumber, economics, returns, CACP concepts, profitability, problems, chi square.

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Introduction

Vegetable cultivation in India is a cornerstone of the nation's agricultural sector, serving as a vital source of livelihood for millions of small and marginal farmers. The country boasts a diverse array of vegetable crops, ranging from staples like potatoes and onions to regional specialties such as okra and regional greens. India's varied climate allows for year-round cultivation, with regions like the Gangetic plains and South India providing favorable conditions. While traditional methods persist, modern techniques like polyhouses and drip irrigation are gaining prominence. Pest and disease management remains a significant challenge, prompting the adoption of Integrated Pest Management (IPM) strategies. The market for vegetables in India is intricate, with a mix of local markets and an expanding presence of organized retail chains. Government initiatives, including subsidies and support for organic farming, aim to bolster this vital sector. However, challenges like water management, post-harvest losses, and inadequate storage facilities persist, highlighting the need for continued investment and innovation in vegetable cultivation practices. Protected cultivation is the practise of growing plants in a regulated and protected environment, frequently with the use of buildings like greenhouses, polytunnels, or shade net houses. This technique offers a number of advantages, including defence against bad weather, pests, and infections. It prolongs the growing season, enabling a more reliable and superior output. Additionally, shielded cultivation allows for greater regulation of variables like temperature, humidity, and light, resulting in an environment that is ideal for plant growth. This method is commonly utilised for many different crops, such as vegetables, flowers, and herbs, and it is essential to modern agriculture because it enables more productive and sustainable practises.

Engaging in protected cultivation for business entails creating controlled environments, such as greenhouses, polytunnels, or shade net houses, to cultivate plants commercially. This approach offers a multitude of advantages for entrepreneurs venturing into the agricultural sector. It allows for year-round production, ensuring a steady income. Additionally, it provides the flexibility to grow a diverse range of crops, from vegetables to exotic varieties, enabling specialization based on market demand. The controlled environment results in increased yields and higher-quality produce, often commanding premium prices. Protection from adverse weather conditions mitigates the risk of crop loss, a significant concern in open-field farming. Moreover, controlled environments facilitate improved pest and disease management, promoting the growth of healthier and more marketable crops. With efficient irrigation systems, resources are used optimally, leading to cost savings and sustainable practices. Entrepreneurs can also explore brand building, direct-to-consumer sales, and potentially even export opportunities. However, achieving success requires meticulous planning, investment, and ongoing management, with factors like location, crop selection, and market access playing pivotal roles. Staying updated with the latest trends and technologies is crucial for sustained success in protected cultivation. Vegetable cultivation under protected cultivation involves growing vegetables in enclosed environments like greenhouses or shade net houses. This method offers numerous advantages, including protection from adverse weather conditions, pests, and diseases, extended growing seasons, and better control over the growing environment. To start, it's crucial to select suitable vegetables for this method, such as tomatoes, cucumbers, bell

peppers, lettuce, and herbs. Site selection plays a significant role, requiring a location with ample sunlight exposure. The choice of structure, be it a greenhouse, polytunnel, or shade net house, depends on factors like climate and budget. Soil preparation involves ensuring well-drained, fertile soil free from pathogens. Controlling temperature and humidity inside the structure is essential, achieved through the use of heaters, coolers, and fans. An efficient drip irrigation system should be in place to deliver water and nutrients directly to the roots. Pest and disease management, though less pressing, still necessitates vigilance and possibly the use of integrated pest management techniques. Nutrient management, support structures, and crop rotation are also critical aspects. Regular monitoring, record-keeping, and careful post-harvest handling round out the process. Continuous learning and adaptation are essential for sustained success in protected cultivation**.**

Materials and Methods

Himachal Pradesh has four agro climatic zones: zone I (Sub mountainous low hills-subtropical (upto 1,100 m), zone II (Mid hills-sub humid (1,100 to < 2,000 m), zone III (High hills temperate wet (2,000 to < 3,000 m) and zone IV (High hills temperate dry (> 3,000 m). Among these, the mid hill zone was chosen to conduct the study as maximum extent of protected cultivation is seen in this zone. In the study area, protected cultivation is an expanding business that is gaining popularity. Cucumber is the main vegetable crop grown under protected conditions in the study area. Multistage random sampling was adopted for selecting the respondents. A list of vegetable grower practicing protected cultivation was procured from the agriculture or horticulture department and other agencies. For the purpose of gathering the necessary data, 240 growers of protected flowers were randomly chosen as a sample. Primary information was gathered from the chosen growers using a personal interview method according to a pretested, carefully designed schedule. Secondary information about the production was gathered from various government agencies, the Department of Horticulture/Agriculture as well as other published materials and websites.

Analytical Framework

Socioeconomic status, economics and growers' perceptions of the production and marketing issues associated with protected cultivation were all examined using simple tabular analysis. To compare, contrast, and interpret the findings, basic statistical techniques including averages and percentages were used.
The following type of indices has been used for estimation of different parameters.

Sex ratio

$$Sex\ ratio = \frac{Number\ of\ females}{Number\ of\ males} \times 1000$$

Literacy rate

$$Literacy\ rate = \frac{Total\ no.of\ literate\ person}{Total\ population} \times 100$$

Cost Analysis

Farm management cost concepts was used to estimate the cost and returns form flowers with the following formulae:

(i) Cost A_1 includes:

1) Seed/Seedling cost
2) Value of manures, fertilizers and plant protection chemicals
3) Hired human labour
4) Bullock labour
5) Owned and hired machinery
6) Irrigation charges
7) Depreciation on implements, farm buildings and irrigation structures
8) Interest on working capital
9) Other miscellaneous charges.

(ii) Cost A_2: Cost A_1 + rent paid for leased in land
(iii) Cost B_1: Cost A_1+ interest on the fixed capital
(iv) Cost B_2: Cost B_1 + rental value of owned land
(v) Cost C_1: Cost B_1 + imputed value of family labour
(vi) Cost C_2: Cost B_2 + imputed value of family labour
(vii) Cost C_3: Cost C_2 + value of management input (10% of Cost C_2).

Analysis of Constraints

It is assumed that the severity of a given issue varies from location to location and grower to grower in order to study the various issues related to the cultivation and marketing. For analysis, the numerous responses from producers describing various issues were taken into account.

Chi-square Test

To test whether there is any significant difference among the growers for the problems faced by them. Chi-square test in m x n contingency table was applied where m and n are the number of marketing problem faced by the farmers.
The detail of approximate Chi-square test (χ^2) is given as under:

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \sim \chi^2 \, (K-1) \, d.f.$$

Where,

O_i = Observed values
E_i = Expected values
K = number of farm size groups.

Results and Discussion

Socio-Economic Characteristics of Sampled Cucumber Cultivators

The adoption of improved technologies is influenced by the socioeconomic characteristics of farmers. According to Table 1, the average family size was found to be 4.85 with 52 and 48 per cent of males and females respectively. The literacy rate was found to be 88.75 per cent. The total landholding was reported to be around 0.62 hectares, out of which 63.64 per cent was cultivated area, 26.94 per cent was under pasture and 9.42 per cent was under land put to non – agricultural use.

Table 1: Socio-Economic Analysis of Cucumber Cultivators in the Study Area

Average size of the Family (number)	4.85
Number of males	52.00
Number of Females	48.00
Literacy rate (%)	88.75
Total Land holding (ha)	0.62
Cultivated area (cereals + vegetables) (%)	63.64
Pasture/ghasnis (%)	26.94
Land put to non-agriculture use (%)	9.42

Economics of Protected Cucumber Cultivation in the Study Area

The economics of protected cultivation of vegetables involve a comprehensive assessment of the aspects associated with growing vegetables in controlled environments like greenhouses, polytunnels, or shade net houses. This encompasses a range of factors, starting with the initial investment required for constructing the facility and installing essential systems for climate control, irrigation, and infrastructure maintenance. Operational costs include ongoing expenses for maintaining the structure, climate regulation, irrigation, labor, and energy consumption. The choice of crops is pivotal, as high-value produce with steady demand and premium pricing can significantly impact profitability. Understanding market dynamics, including pricing fluctuations, consumer preferences, and demand patterns, is crucial for making informed business decisions. Additionally, considerations like pest and disease management, post-harvest handling, and access to government support programs also play a vital role in determining the overall economic viability of the venture. Diligent record-keeping and regular analysis of expenses, yields, and revenues are fundamental for effective financial management. Conducting a thorough feasibility study and staying abreast of industry trends are essential steps in ensuring the success and profitability of a protected cultivation business. The results of a study on the cost factors of growing cucumber under different sizes of polyhouses are shown in Table 2. The Costs A_1, B_2, and C_3, at an overall level for polyhouses of size upto 252 m^2 were ₹ 42854.22, ₹ 45638.49 and ₹ 54965.38 respectively, according to the table. For polyhouses of sizes 252-500 m^2, the Costs A_1, B_2, and C_3 were ₹ 104869.36, ₹ 114685.12 and ₹ 139365.42 respectively. However, for 501-1000 m^2 sized polyhouses, the Costs A_1, B_2, and C_3 were ₹ 142789.66, ₹ 151628.42 and ₹ 183603.17 respectively.

The estimates of the output input ratio and returns were also computed to determine the relative profitability of crops in the study area for various sizes of polyhouses. For polyhouses of size upto 252 m^2 the returns and output – input ratio were computed to be ₹108831.45 and 1.98. For 252-500 m^2 sized polyhouse, returns were ₹108831.45 and output input ratio were 2.12. For 501-1000 m^2 sized polyhouse, returns and output input ratio were found to be ₹413107.13 and 2.25 respectively.

Table 2: Average Cost and Returns of Cucumber Cultivation In the Study Area

(₹/unit)

Particulars	Upto 252 m^2	252-500 m^2	501-1000 m^2
Cost A_1	42854.22	104869.36	142789.66
Cost B_2	45638.49	114685.12	151628.42
Cost C_3	54965.38	139365.42	183603.17
Returns	108831.45	295454.69	413107.13
Output input ratio	1.98	2.12	2.25

Problems Faced by Farmers In the Study Area

Vegetable protected growers encounter a range of challenges in their operations. One significant hurdle is the substantial initial investment required to set up a protected cultivation facility, covering construction, climate control systems, and essential equipment. Ongoing operational costs, including maintenance, climate control, labor, and energy expenses, can be quite significant. Market fluctuations, especially in vegetable prices, pose a risk to profitability. Managing pests and diseases in controlled environments can be more complex due to heightened humidity levels. Additionally, protected cultivation demands a higher level of labor input for tasks like planting, pruning, and maintenance. Specialized knowledge in areas such as climate control and pest management is essential, and an absence of expertise can lead to reduced yields. Balancing climate conditions within the protected environment can result in higher energy costs. Selecting the right crops and implementing effective rotation strategies is crucial for maximizing profitability, while market access and distribution can be a challenge, particularly for smaller-scale growers. Regulatory compliance, risk management, and environmental sustainability are also significant concerns. Adapting to evolving consumer preferences and market demands is essential for maintaining competitiveness. Overcoming these challenges may require ongoing education, technology adoption, and collaboration with industry peers.

Using the chi square test, constraints were recorded and it was found that significant problems were higher cost of replacing material, unavailability of local market, unavailability of healthy planting material and lack of technical knowhow and high transportation cost.

Table 3: Farm Category wise Problems Faced by Flower Growers in the Study Area

(Multiple Response Per cent)

Sr. No.	Problem	Overall	Chi square
1.	Higher cost of replacing material	0.69 (24.63)	2.06
2.	Unavailability of healthy planting material	0.75 (26.87)	4.03
3.	Unavailability of local market	0.69 (24.63)	7.39*
4.	Lack of technical knowhow and high transportation cost	0.67 (23.88)	1.39
	Total	2.79 (100)	

(Figure in the parentheses is percentage of total)

Conclusion

It may be concluded that the costs incurred in protected cultivation under various polyhouse sizes of cucumber were lesser as compared to the returns obtained. The input output ratio under upto 252 m^2, 252 - 500 m^2 and 501-1000 m^2 sized polyhouses were 1.98, 2.12 and 2.25. This shows that it is economical to grow cucumber under protected cultivation. It indicated that by investing one rupee, we get 1.98, 2.12 and 2.25 rupees respectively.

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