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## Constraints in adoption of protected cultivation technologies in semi-arid eastern plains zone of Rajasthan

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### Abstract

The present investigation was conducted in Semi-arid Eastern Plain Zone of Rajasthan with objective to find constraints in adoption of protected cultivation technologies. The study was conducted in the year 2022–2023. A total of 120 farmers were selected as sample respondents through multistage sampling process. The findings showed that the biggest barriers to farmers adopting protected cultivation technologies were a lack of scientific know how about cultivation practices under protected conditions, a lack of technical guidance about crop production techniques, a high initial investment, a high cost of planting materials, a lack of marketing facilities at locality, and insufficient expertise in supply chain management.

**Keywords:** Adoption of protected cultivation technologies, semi-arid eastern plains zone, marketing

### Introduction

The adverse effects of the green revolution including declining soil fertility, the emergence of new insect pests and diseases, as well as the depleting underground have led farmers to consider alternative methods of cultivation. These alternative methods are likely to mitigate harmful effects of the green revolution and offer the possibility of growing crops throughout the year. Protected cultivation technology is one of these promising alternatives for farmers. Protected cultivation involves intensive use of resources such as soil, water, fertilizers, pesticides, and energy. Protected cultivation is being adopted by farmers in India. India being a vast country with diverse and extreme agro-climatic conditions, cultivation of crops under protected environment could be used for off-season production of high-value crops, production of virus-free quality seedlings and hybrid seeds. Despite the successful development of the technology at research stations, the adoption of protected cultivation technologies, particularly at the smallholder farmer level, has not been satisfactory. There are sporadic success stories in southern India, but its benefits are yet to materialize in the northern parts of the country. Though, the adoption of protected cultivation technologies varies significantly across Indian states. Majority of farmers practicing cultivation under protected environment are large farmers. Practicing cultivation under protected environment required high initial cost and specialized knowledge. In this context, it is important to delineate the constraints faced by farmers in adoption of protected cultivation technologies and to formulate strategies to overcome the challenges. With this background, the study was undertaken to identify the constraints in adoption of protected cultivation technologies in semi-arid eastern plains zone of Rajasthan.

### Methodology

The present research was carried out in the semi-arid zone of eastern plains of Rajasthan, which includes Jaipur, Ajmer, Dausa and Tonk districts of Rajasthan. All four districts of the zone, viz. Jaipur, Ajmer, Dausa and Tonk were purposively selected for the study. A sample of 120 farmers was selected using a simple random sampling procedure.

A comprehensive list of constraints in adoption of protected cultivation was prepared and perception of farmers on were rated on a 5-point scale on a five-point continuum of very severe to least severe with score 5, 4, 3, 2, and 1 accordingly. Relevancy coefficient of each constraint was calculated using following formulae:

$$RC_i = \frac{\text{Total score of all the respondents for } i^{\text{th}} \text{ constraint}}{\text{Maximum on the continuum} \times \text{Total number of respondents}}$$

RC<sub>i</sub> refers to Relevancy Coefficient for the i<sup>th</sup> constraint.

The ranking of constraints was carried out according to its relevance coefficient. Constraint with the highest relevance coefficient was placed first and was subsequently ranked according to the relevancy score they received in that order.

## Results and Discussion

### Technical constraints

It is clear from Table 1 that the lack of technical know-how regarding cultivation of crops under protected environment was the most serious constraint faced by farmers and ranked

first based on the relevance coefficient (0.87). Furthermore, lack of technical guidance (0.79) and unavailability of a package of crop production practices (0.75) under a protected environment were other serious constraints faced by farmers and were ranked second and third respectively. Unavailability of quality planting material at time of requirement and in required quantity, unavailability of material required for construction of protected environment structure in local markets. Unavailability of quality planting material in required quantity at the time of requirement, unavailability of quality equipment/materials required for protected environment in the local. Similarly, Rajesh and Shivalingaiah (2022) [3] reported that lack of scientific know how on innovative cultivation practices and lack of availability of planting material at the time of requirement were the major barriers for farmers in protected cultivation technology.

**Table 1:** Technical constraints in adoption of protected cultivation as perceived by farmers (n=120)

Constraint	Relevancy coefficient	Rank
Lack of technical know-how regarding crop cultivation under protected environment	0.87	I
Lack of technical guidance about cultivation practices in a protected environment	0.79	II
Unavailability of quality planting material at time of requirement and in required quantity	0.76	III
Lack of relevant literature in local language	0.75	IV
Non-availability of quality polyhouse equipments at local market	0.73	V
Non-availability of quality inputs like pesticides and insecticides at right time	0.67	VI
Limited and irregular power supply	0.63	VII

### Economic constraints

The economic constraints faced by farmers in adopting protected cultivation practices shown in Table 2 show that the

initial costs required to create a controlled environment structure for crop production were very high and are still a problem for farmers, especially small and medium farmers.

**Table 2:** Economic constraints in adoption of protected cultivation technologies as perceived by farmers (n=120)

Constraint	Relevancy coefficient	Rank
High initial investment	0.89	I
High cost of planting material	0.83	II
Lack of awareness about loan and subsidy facilities.	0.78	III
Lack of access to subsidies	0.67	IV
High wages of skilled labour	0.64	V
Absence of insurance plans for flower and vegetable crops	0.64	VI
High transportation cost	0.56	VII
High cost of plant protection chemicals	0.43	VIII

Growing crops in a protected environment requires an environmental control structure, quality planting material, specialized equipment, and chemicals, adding additional financial burden to farmers. Protected cultivation is an intensive practice involving qualified labor throughout the year. The low accessibility to subsidies and the absence of a pricing policy including harvest insurance have further increased the risk of protected cultivation. Singh and Sirohi (2006) [5] also testified that the elementary manufacturing and operating cost of climate-controlled structure were very high and that was not suitable for farmers.

### Marketing constraints

Most respondents believed that the main obstacles to marketing were the lack of marketing facilities at the local level, such as block or district headquarters, the lack of dedicated supply chain management, including the cold chain, and the lack of specialized markets for agricultural products grown in a protected environment (Table 3). The Indian farmer is a price taker and not a price setter. This affects more crops for which there is no pricing policy, such as fruits, flowers, and vegetables.

**Table 3:** Marketing constraints experienced by farmers in adopting protected cultivation (n=120)

Constraints	Relevancy coefficient	Rank
Lack of marketing facilities at local level	0.76	I
Lack of dedicated supply chain management	0.74	II
Lack of exclusive markets for flowers and vegetables	0.73	III
Market price fluctuations	0.69	IV
Market price fluctuations	0.64	V

## Conclusion

Protected cultivation technologies provide the ways to the production of crops that are both highly productive and of outstanding quality. It also generates employment and increases agricultural income, provides foreign exchange earnings and efficient use of scarce agricultural land. The successful adoption of this technology also depends on how farmers integrate it into their farms to adapt it to their socio-economic and agro-ecological conditions. Since protected crop technology is capital intensive, farmers should be made aware of the profitability of protected crops as an agricultural enterprise, financial incentives and development of low-cost protected crop structures suitable for various crops and agro-climatic conditions.

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