

Farmers' Perceived Benefits 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 Plains Zone of Rajasthan during the year 2022-23. To give representation to entire zone all four districts Jaipur, Ajemr, Dausa and Tonk were selected purposively for the study. A multistage sampling technique was used to select respondents. A total of 120 farmers were selected as sample respondent for the study. An interview schedule consisting of measuring devices of dependents and independents variables along with the face data of farmers was used for collecting responses of the respondents. The data so collected were tabulated and given statistical treatment. It was observed that higher crop yield per unit area, no abiotic or biotic stress to plants, minimum infestation by weeds, higher input use efficiency and minimizes the use of pesticides were perceived as the most important advantages of protected cultivation as indicated by higher RBQ value.

Keywords: Farmer, Agriculture, Protected Cultivation, Benefits

Introduction

Agriculture has been the backbone of India's economy for ages. Apart from the economy, it is also a big employment source as agriculture provides jobs to 90%. India is self-sufficient in agriculture which provides proper food security and also exports high-quality fruits and vegetables. Still, the demand for quality agricultural production has increased over the last decade and not completed by India. So, to complete the market demand, Indian agriculture needs new and effective production technologies that can continuously improve the agricultural sector's productivity, profitability, and respectability. Climate change is becoming an increasingly significant global problem that can no longer be ignored. The main underlying cause is anthropogenic, i.e., unsustainable use of fossil fuels, forest degradation for industrialization, and rapid urbanization with an overpopulation (Mukherjee *et al.*, 2016). Protected cultivation being a beneficial technology is adopted by developing countries including India. This farming method is a new farming method that allows variations in the climatic conditions and many cropping patterns. India has a big problem of climatic extremes such as floods, droughts and other climatic abnormalities that cause crop losses regularly or damages resulting in

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economic losses. So, to avoid these all harmful conditions, the protected cultivation method was founded, which provides better opportunities for the Indian farmers. The adoption of protected cultivation technology can take Indian agriculture to the new successful way. Through this method, farmers can easily complete the high market demands without any extra effort. The greenhouse is one of the best examples of protected cultivation which commercially used for the production of non-native and off-season vegetables, flowers and quality seedlings. Through the greenhouse method, the economic returns of high- value agriculture products increased substantially. It used as a rain shelter, and suitable regions for the greenhouse are high rainfall, like North-eastern states and coastal regions. In the protected cultivation, the less use of chemical pesticides and insecticides avoid their residues on the crop production.

Protected cultivation involves the intensive use of resources such as soil, water, fertilizers, pesticides, and energy. Polyhouse 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 high cost infrastructure, round the year employment to the farmers were the major prospective aspects perceived by poly house farmers (Ghanghaset *al.*, 2018). The greenhouse of the future will have nearly zero environmental impact. This goal can be achieved by developing a sustainable greenhouse system that: does not need any fossil energy and minimizes the carbon footprint of equipment; with no waste of water nor emission of fertilizers and full recycling of the substrate; with minimal need of plant protective chemicals, yet with high productivity and resource use efficiency. The greenhouse of the future can fulfill the need for the safe use of resources (energy, water, pesticides) through modification of greenhouse design and management. The greenhouse can benefit from the reduction of waste through better management of irrigation and climate. A manifold increase in the resource-use efficiency in crop production can be obtained through protected cultivation compared to open field conditions. In protected cultivation, high-value cash crops, vegetables, and flowers are grown and managed under controlled conditions with higher per unit productivity and profitability (Choudhary, 2016). Polyhouse cultivation is an alternative new technique in agriculture to picking up position in rural India. It diminishes reliance on rainfall and makes the ideal utilization of land and water assets because of the guaranteed framework. In polyhouses, the water is supplied by drip irrigation with due effect, water is less utilized when contrasted with open cultivation. In open field conditions nearly one-third of the crops may be lost due to the attack of insects and worms, whereas in polyhouses farming, we can harvest the crops about 2 to 3 times more without much damage or loss. Polyhouse farming can help the farmer generate income around the year growing multiple crops and fetching premium pricing for off-season vegetables. 'Protected cultivation' has offered a new dimension to get more income in a limited area in a district. Several studies have been conducted on horticulture crops in open field condition to know the Adoption, but very few research studies have been conducted on protected cultivation in this regard. Some of the studies shown that, there is a tremendous scope for development of technologies which is suitable production under protected cultivation. With this background, the study was undertaken to identify perceived benefits of protected cultivation technologies in semi-arid

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eastern plains zone of Rajasthan.

Methodology

The present investigation was undertaken in in Agro-climatic Zone 3-A which represents Semi-arid Eastern Plains Zone of Rajasthan. The Agro-climatic Zone 3-A comprises Jaipur, Ajemr, Dausa and Tonk districts of Rajasthan. In order to give representation to entire zone all four districts viz. Jaipur, Ajemr, Dausa and Tonk were selected purposively for the study. From each district, 30 farmers who have adopted protected cultivation technology were selected for the study. Thus, the total sample of 120 farmers was selected by using multistage simple random sampling procedure.

An interview schedule consisting of measuring devices of dependents and independents variables along with the face data of farmers was used for collecting responses of the respondents. Data were collected personally by interviewing the respondents with the help of pretested structural schedule. Collected data were tabulated properly. Mean and standard deviation, coefficient of correlation method of statistics were used for interpretation of data.

The major benefits protected cultivation were first identified by a pilot study. Based on the pilot study, in all major benefits was identified. The intensity of these identified benefits in the actual field situation was measured to prove their validity and to find out the extent to which they were perceived by farmers as benefits in protected cultivation. Farmers was also asked to rank the benefits they perceive in order of preference. The data thus collected were tabulated and statistically analyzed to interpret the results. MS Excel 2019 was used to calculate the RBQ by the formula as given below in equation. The quantification of data was done by first ranking the benefits based on the responses obtained from the respondents and then calculating the Rank Based Quotient (RBQ) (Sabarathnam, 1988), which is as follows:

$$RBQ = \frac{\sum f_i (n+1-i) \times 100}{N \times n}$$

Wherein,

f_i = number of farmers reporting a particular benefit under i^{th} rank

N = number of farmers

n = number of benefits identified

i = Concerned ranks

Results and discussion

Protected cultivation is the modification of the natural environment to achieve optimum plant growth. Through protected farming, farmers can get better production in adverse conditions. In

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modern agriculture, protected structures have demonstrated their maximum potential for higher production with higher productivity. The major advantages of protected cultivation were first identified by a pilot study. The intensity of these identified benefits in the actual field situation was measured to prove their validity and to find out the extent to which they were perceived by farmers as benefits in protected cultivation. Farmers was also asked to rank the benefits they perceive in order of preference. The data thus collected were tabulated and statistically analyzed. The results perceived advantages of protected cultivation have been presented in Table 1.

Table 1. Distribution of respondents according to the rank provide for benefits in adoption of protected cultivation

(n=120)

Statements	RBQ (%)	Rank
Higher crop yield per unit area	89.45	I
No abiotic or biotic stress to plants	87.12	II
Minimum infestation by weeds	83.97	III
Higher input use efficiency	77.17	IV
Minimizes the use of pesticides	75.37	V
Grow medicinal and rare plants	71.80	VI
Superior quality of produce is	69.00	VII
Produce crops all year round	65.55	VIII
Reduces gestation period of the crop	57.34	IX

It is obvious from the Table 1 that higher crop yield per unit area was perceived as the most important advantage of protected cultivation as indicated by highest RBQ value of 89.13. protected cultivation is one such cropping technique that preserves plants from all kinds of stresses and based on RBQ value (87.65) no abiotic or biotic stress to plants was second most important advantage of protected cultivation. Rana *et al.* (2021) confirmed that protected cultivation technique reduces these stresses by providing complete controlled condition. Minimizes the use of pesticides was identified next most perceived advantage of protected cultivation. Protected cultivation encompasses a sustainable approach which helps in changing the micro climate hence certain insects cannot enter. This is expected to minimal use of pesticides. Supporting these results Pachiyappan *et al.* (2022) reported that protected cultivation is an innovative way of raising seasonal and off-seasonal crops under a controlled environment. Crops have tremendous potential to augment productivity, generate employment, utilize land efficiently and enhance export. Moreover, most of the crops grown in

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polyhouses are highly profitable at different discount rates (7%, 10% and 12%), whereas a few crops were rewarding under shade net condition with subsidies. With perfect plant environment control and appropriate structures like polyhouse, farmers were expecting year-round cultivation. Protected cultivation prevented the growth of weeds as they controlled the temperature conditions by using several structures. With no weed growth there was higher uptake of micro-nutrients by the active zone of the roots. This process conserved soil moisture and thereby reduced the requirement of irrigation water.

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