



Research Article

CONSTRAINTS FACED BY FARMERS IN BOTTLE GOURD CULTIVATION UNDER LOW TUNNEL AND OPEN FIELD CONDITION IN BIKANER DISTRICT OF RAJASTHAN

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Abstract: The study has been carried out purposively in Bikaner district of Rajasthan to ascertain constraints perceived by low tunnel technology growers of bottle gourd. A detailed interview schedule in relation to various aspects of low tunnel technology and open field was prepared and data collected from personal interview method. Farmers in the study area were asked to rank each constraint which was analyzed using Garret's ranking technique. The study revealed that under low tunnel constraints perceived by the farmers were high cost of hybrids seed (67.16%), labour requirements (62.56%), poor-quality water (61.86%), high price of polythene sheet (48.80%), short life of polythene sheet (46.66%), lack of market information (32.10%) and Lack of technology knowledge (31.66%).

Keywords: Low tunnel technology, Economic constraints, Bottle gourd, Low tunnel, Technology hybrid seed

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Introduction

Vegetables can be grown in off-season, with the introduction of green houses, low and high poly tunnel technology, in which temperature and moisture are controlled for precise growth of vegetable. The production of vegetables all around the year enables the growers to fully use the resources and extra income from vegetable growing as compared to other normal agricultural crops. Low tunnels are miniature structures producing greenhouse like effect. In these tunnels, plastic sheets are used for roof covering of the tunnel with shaped structure having low height, which is built with steel bars. These tunnels facilitate the setup of carbon dioxide, thereby enhancing the photosynthetic activity of the plants and hence the yield. [1]

The low tunnels technology is mainly suitable for off season cultivation of cucurbits like muskmelon, round melon, long melon, bitter gourd, bottle gourd and summer squash etc. Apart from off season cultivation of cucurbits it can be also be used for cultivation of cabbage or cauliflower during summer, leafy vegetables such as coriander or spinach etc. during rainy season [2].

India ranks as the second-largest global producer of vegetable crops, yet its current vegetable production falls short of meeting the dietary needs of its population for a balanced diet. To bridge this gap, various strategies can be employed. These strategies include expanding the cultivation area for vegetables through the utilization of hybrid seeds, adopting enhanced agricultural practices, and promoting the advancement of protected cultivation methods for vegetables like low tunnel technology [3]. In the case of low tunnel farmers primarily use them early in the spring and then remove them early after the risk of cold has passed. This practice does not allow farmers to take advantage of the full benefits of the technology. Low tunnel improves vegetative growth, increase yield, improve water and nutrient use efficiency. In addition, insect nets and row covers can eliminate insects from the crop and reduce pest damage. In short, low tunnel can improve production and land use efficiency. Promoting the cultivation of off-season vegetables in affordable poly houses has proven to be a cost-effective and lucrative opportunity for boosting the income of small and marginal farmers. Additionally, this technology ensures year-round access to a variety of vegetables, contributing significantly to the nutritional security of the country's population [4].

In the research, it was found that employing low tunnels allows for the early cultivation of cucurbits during the spring or summer, enabling them to be sold at premium prices in the market [5,6]. Additionally, in another study, it was noted that cost-effective and lower-height structures such as shade nets and tunnel cultivation are well-suited for arid ecosystems, where extreme temperature variations, high wind speeds, and dust storms are prevalent occurrences [7]. There are many advantages of low tunnel technology like off-season availability of vegetables, higher marketable yield and good quality of the produce, premium market returns due to early market arrival of the produce and moisture remains for longer period in soil due to deep tunnels [8].

Material and Methods

Multi-stage sampling technique was used for the selection of sample farmers in the present study. The Bikaner district of Rajasthan has been purposively selected for the study. From the Bikaner district a list of vegetable growing farmers was collected from the various public sources and government agencies. From the list of vegetable growers 60 farmers will be selected randomly i.e., 30 farmers with low tunnel technology and 30 farmers without low tunnel technology. The primary data was collected from the selected cultivators using personal interview method. The Garrett technique was used to evaluate the problems faced by the researchers. The orders of merit given by the respondents were converted in to rank by using the formula. To find out the most significant factor which influences the respondents, Garrett's ranking technique had been used. According to this approach, survey participants were tasked with assigning ranks to all the factors, and the results of this ranking were subsequently transformed into numerical score values using the following formula:

$$\text{Percent position} = 100 (R_{ij} - 0.5) / N_{ij}$$

Where,

R_{ij} = Rank given for the i^{th} variable by j^{th} respondents

N_{ij} = Number of variables ranked by j^{th} respondents

With the help of Garrett's Score Table, the percent position estimated is converted into scores. For each factor, the individual scores assigned by respondents are summed up, resulting in both a total score value and a mean score value. The factor with the highest mean score is the most important factor.

As per this method, respondents have been asked to assign the rank for seven factors and the outcomes of such ranking have been converted into score value with the help of the following formula in Bikaner region of Rajasthan.

Table-1 Factor in low tunnel technology

SN	Factors
1	Labour requirement
2	Lack of technology knowledge
3	Poor quality water
4	High cost of hybrid seeds
5	High price of polythene sheet
6	Lack of market information
7	Short life of polythene sheet

Table-2 Factor used in open field

SN	Factors
1	Labour requirement
2	Lack of technology knowledge
3	Poor quality water
4	High cost of hybrid seed
5	Lack of market information

Result and Discussion

The result from [Table-3] indicates the various constraints experienced by the low tunnel vegetable grower farmer in the study area. The study revealed that, major challenges experienced by farmers grow Bottle gourd in low tunnel technology high cost of hybrid seed (67.10), labour requirement (62.56), poor quality water (61.86), high price of polythene sheet (48.6), short life of polythene sheet (46.66), lack of market information (32.1), lack of technology knowledge (31.66). In a similar study on constraints faced in poly house vegetable cultivation in Haryana State reveals that short life of polysheet (92.5%) and infestation of insect-pest (90%) were found high in case of production constraints whereas lack of minimum support price (92.5%), high price fluctuation (87.5%) and lack of market information (75%) were major constraint in case of marketing constraints [9]. The similar findings were also reported in past research [10, 11, 12, 13 and 14]. Contrary to the above findings, in the earlier study, farmers lack the knowledge to effectively combat the rising infestations of insects, pests, and diseases in tunnel farming [15].

Table-3 Calculation of garret value and ranking in low tunnel technology

Factor	Total	Average score	Rank
F1	1877/30	62.56	2
F2	950/30	31.66	7
F3	1856/30	61.86	3
F4	2015/30	67.16	1
F5	1458/30	48.60	4
F6	963/30	32.10	6
F7	1400/30	46.66	5

The result from [Table-4] indicates the various constraint experienced by the open field Bottle gourd growers' farmers in the study area. The study revealed that the major challenges experienced by farmers grow bottle gourd in open field poor quality water (67.66), high cost of hybrid seed (61.5), labour requirement (38.06), lack of market information (34.73), lack of technology knowledge (34.56). The earlier investigations identified the major constraints faced by the farmers in commercial cultivation of vegetables were low prices of vegetables during harvesting (83.30 per cent) followed by lack of improved seeds, high wages of labourers amongst the constraint based on constraint facing index [16].

Table-4 Calculate of Garret's value and ranking in open field

Factor	Total	Average score	Rank
F1	1142/30	38.066	3
F2	1030/30	34.56	5
F3	2030/30	67.66	1
F4	1845/30	61.50	2
F5	1042/30	34.73	4

Conclusion

Low tunnel technology is a new technology of growing off season crops, primarily it is more successful of cucurbits crops. It is comparatively cheaper than costly high-tech polyhouse and at the same time this technology can generate good revenue from vegetable crops. By studying the constraint faced by the growers of bottle gourd using low tunnel technology and in open field through Garrett's ranking technique, it was revealed that major problems were high cost of hybrids seed, labour requirement, poor quality water. In open field rank first was poor quality water, second was high cost of hybrids seed, and third was labour requirement.

Application of research

The present study provides the major constraints confronted in adoption of this technology and gives us the idea about their knowledge level and perception about such innovative technology.

Research Category: Agricultural Economics and Management

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Study area / Sample Collection: Bikaner District of Rajasthan

Cultivar / Variety / Breed name: Bottle Gourd

Conflict of Interest: None declared

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