

Cultivation of cucurbits on bower system:

an innovative way of enhancing farmers' income

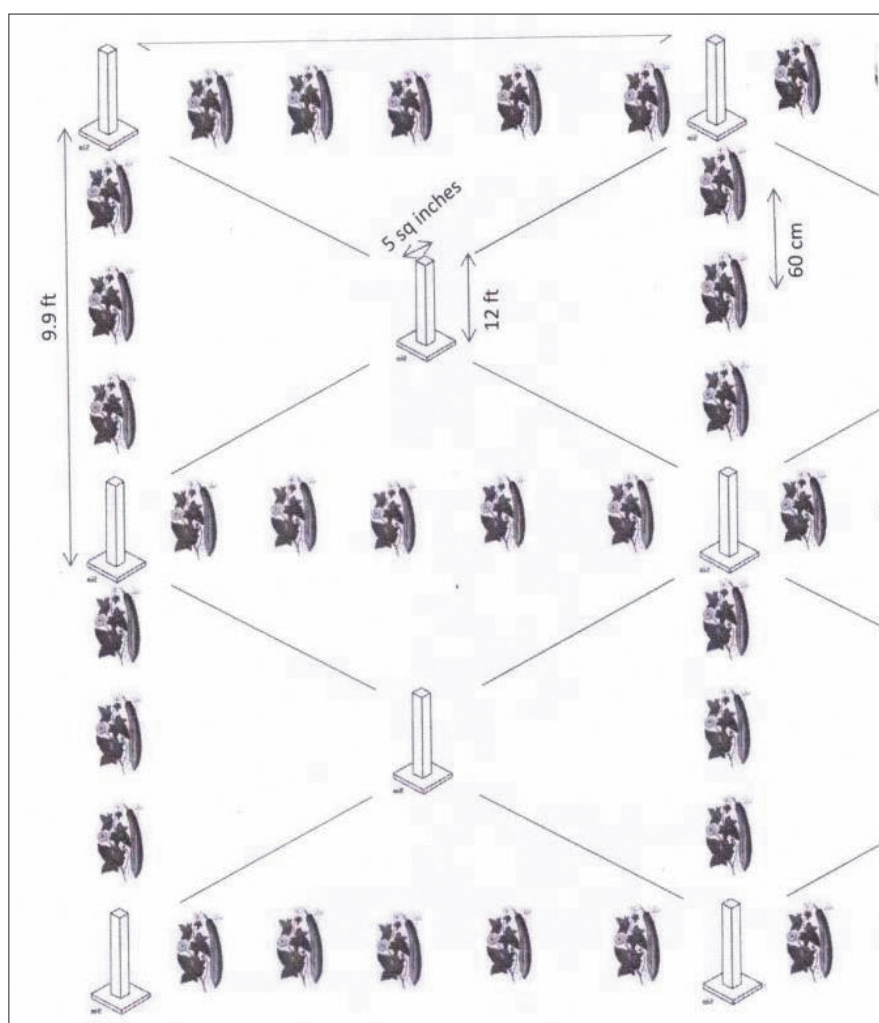
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The potential of cucurbits cultivation on bower system to realise the goal of doubling farmers' income has been demonstrated. This innovative method enhanced the vegetable production, thereby increasing the land-use efficiency in south-western Punjab. In traditional systems, farmers found it difficult to manage weed infestation in fields due to the excessive growth. Cultivation of cucurbits on beds had limited success due to crop failure owing to heavy rains in monsoon. While on a bower system, vines can be easily managed. In addition, weed infestation is greatly reduced and fruit set is more because of increased sunlight penetration, thus benefitting the farmers economically.

Keywords: Bottle gourd, Doubling farmers' income, Sponge gourd

FARMERS' income is far less than the income generated in the non-farming sector. The low and highly fluctuating income in the farming sector has been the major issue threatening the sustainability of the farming system. Therefore, enhancing farmers' income in the agriculture sector has been a key issue to address farmers' distress and their livelihood. Recently, Honourable Prime Minister of India, Sh. Narendra Modi Ji has shown keen interest in upscaling rural livelihood and set the goal of "Doubling Farmers' Income" by 2022. In the long run, improvement in income is possible through technological advancements with reduced cost of production and improved resilience to deal with multiple challenges in the context of climate change. For the successful implementation of various strategies for doubling farmers' income, several innovations are suggested by agri-experts and policymakers, but banking on farmers' innovative ideas could be one of the best options for doubling farmers' income. Many farmers in different states of India have adopted innovative ways to enhance their income. One such innovation is the cultivation of cucurbits on



Diagrammatic representation of a typical bower system being used by the farmers in south-western Punjab for cucurbits cultivation

the bower system which has huge potential to generate additional income by improved vegetable production and increased land-use efficiency in south-western Punjab.

Genesis of the innovation

In south-western Punjab, farmers were growing grapes (var. pearlette) on bower systems. In the late 1990s, grape producers in this region uprooted the vines from their orchards due to low market price and crop damage caused by pre-monsoon showers in May–June. One major reason for the failure of grape producers was the highly perishable nature of the product with low shelf life, besides a market glut of products harvested in a short period of time. Most of the farmers uprooted even their well-established orchards. On the other hand, vegetable growers were suffering from yield loss during the rainy season due to excessive, irregular

and uneven distribution of rains. In view of that, some of the innovative farmers in this part of the country started using their abandoned bower system structure for trailing cucurbits, viz. bottle gourd, sponge gourd and bitter gourd during the rainy season for increased and quality vegetable production.

Success of technology

Vegetable cultivation on the bower system has been a great success among vegetable growers. In a traditional system, cucurbit cultivation on beds had limited success due to crop failure owing to heavy rains in monsoon. During the rainy season, insect-pest infestation and disease incidents were more severe due to increased humidity. Sometimes there was very less flowering and fruiting due to excessive vine growth in the rainy season. Fruits would become

over-ripened to a significant extent and farmers were not able to get good selling prices in the market. Farmers would find it difficult to manage weed infestation in fields due to their excessive growth. Harvesting was labour intensive and time consuming. But, vegetable cultivation in the bower system particularly during the rainy season has the potential to tackle these problems. On a bower system, vines can be easily managed. In addition, weed infestation is greatly reduced and fruit set is more because of increased sunlight penetration. Among others, the greatest advantage of vegetable cultivation on the bower system is that it becomes easy for the farmers to locate the fruits, which otherwise may remain hidden due to excessive vegetative growth. Farmers can easily monitor the crop for optimum and marketable fruit size, and can make a decision for harvesting. Since the fruit starts hanging down the structure, the chances of fruit getting damaged due to contact with moist soil are less.

Details of technology

Bower system includes cemented poles (square) that are 12 feet long and 5 square inches thick. These poles are fixed about 12 feet high above the ground for easy working of tractors below the bower system for different intercultural operations. For 1 acre area, a total of 244 poles are installed at a spacing of 12.2 feet (line-to-line spacing) × 9.9 feet (pole-to-pole) in the outer boundary with inner rows, having alternate rows of poles. A network of 8 mm thick wire is established with a mesh size of 1.5 feet × 1.5 feet above the poles. A wire of 14 mm thickness is used at the boundary of the bower system. The entire bower system structure remains stretched. The boundary poles are fastened tightly with iron pegs using clamps. The cemented poles are fixed about 2 feet below the ground surface with a concrete foundation. For the entire bower system structure, an expenditure of about ₹2.5 lakhs is required as a one-time investment.

During the month of June, the



Sh. Lovejeet Singh Dhillon, a progressive farmer of village Burj Dhillwan, district-Mansa in his field with bottle gourd cultivation on the bower system structure



Sh. Davinder Singh Dhillon, a progressive farmer of village Burj Dhillwan, district-Mansa in his field under vegetable production

nursery of cucurbits, viz. sponge gourd, bottle gourd and bitter gourd are transplanted in the field keeping a plant-to-plant distance of 60 cm. After about 25 days of transplanting, vines are tied with nylon threads to the mesh to trail them on the well-framed wire network. As the vines start trailing and spreading on the wired network, leaves are clipped to allow sunlight to penetrate and reach the ground surface. First picking of fruits starts at about 45 days after transplanting in ridge gourd, 60 days in bottle gourd and bitter gourd. Some farmers cultivate leguminous crops like cowpea under the bower system as vertical farming to increase land-use efficiency. The cultivation of leguminous crops helps in improving soil health at no additional cost. The leguminous crop helps farmers get additional income. The details of average yield, cost of cultivation, net income and benefit:cost ratio for bottle gourd and sponge gourd trailed on bower system are given in Table 1.

SUMMARY

This technology has a great potential on limited land, especially for small and marginal vegetable growers who intend to increase their production and aspire to get higher market prices. The success of this system can be gauged from the investment made by farmers to raise this system for vegetable cultivation. Farmers have further started evolving this technology by

Table 1. Economic analysis of cucurbits cultivation during the rainy season on bower system

Economic parameter	2018	2019	2020	Mean
<i>Bottle gourd</i>				
Yield (q/ha)	230.3	247.0	241.0	239.4
Average variable cost (₹/ha)	128000	136250	138000	134083
Average selling price of fruit (₹/kg)	17.6	20.8	24.5	21.0
Average gross Income (₹/ha)	404319	513760	590450	502843
Average net income (₹/ha)	276319	377510	452450	368760
Benefit:cost ratio (B:C)	3.2	3.8	4.3	3.7
<i>Sponge gourd</i>				
Yield (q/ha)	316.0	368.8	311.8	332.2
Average variable cost (₹/ha)	131250	141250	143500	138667
Average selling price of fruit (₹/kg)	12.8	14.1	16.2	14.4
Average gross income (₹/ha)	404480	518463	505035	475993
Average net income (₹/ha)	273230	377213	361535	337326
Benefit:cost ratio (B:C)	3.1	3.7	3.5	3.4



A view of bumper sponge gourd (a) and bottle gourd (b) crop on bower system in village Burj Dhillwan, district Mansa

growing other vegetable crops with bitter gourd on the boundary sides of the structure. The technology has helped farmers in further enhancing their income as they can get two or

more crops simultaneously.

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Jai Kisan, Jai Vigyan

- A total of ₹ 788.33 crores have been sanctioned for opening six new agricultural colleges for eastern India under Central Agricultural University, Imphal, and a new Central Agricultural University in Meghalaya.
- For the establishment of two new agricultural research institutes in Asom and Jharkhand, a sum ₹ 100 crores is allocated.
- First academic session of the Rani Lakshmbai Central Agricultural University has been allocated for four new agricultural colleges in Datiya and Jhansi.
- An Memorandum of Understanding was signed for transforming the Rajendra Central Agricultural University, Pusa, Samstipur, Bihar. A proposal of ₹ 400 crores is submitted in EFC.
- Post-Graduate Institute of Horticulture is being established in Amritsar, Punjab.
- Foundation stone of the Indian Institute of Agricultural Biotechnology is laid at Ranchi for promoting agricultural biotechnology.