Original Research Article

An Economic Analysis in Gerbera Under Climate Controlled Polyhouse

ABSTRACT

Gerbera cultivating area in India is increasing gradually during last decade due to its increasing demand in market. The freshness and long-lasting characteristics of this flower are delight to use it in the parties, wedding functions, flower arrangements, and flowers bouquet in the form of ornamental flowers. Commercial value of this flower is very high in India.Among severalcut flowers grown under controlled environment, gerbera has its importancebecause of its unique petal colors, long vase-life and market demand. In tropical and subtropical climate, gerbera is growing in greenhouses to produce quality flower. Present study was conducted to know the cost of cultivation and returns of gerbera cultivation in poly house. The total cost of cultivation of gerbera when cultivated under polyhouse of 1000 m^2(0.10 ha) was Rs. 394223 with an income of Rs. 875000, resulting in BCR of 2.22.

Keywords: Gerbera, Costs, Returns, BCR, Polyhouse, Amortization

INTRODUCTION

Gerbera (*Gerbera jamesonii*Bolus ex Hooker F) belongs to Asteraceae family and native of tropical Asia and Africa. It is an important commercial cut flower crop consisting of 45 species and has a very good export potential because of its graceful appearance, hardiness and ability to withstand during transportation and long shelf life. These are stemless perennial herbs which produces an elegant flower called as “head or capitulum”. The major Gerbera producing states in India are Maharashtra, Karnataka, Gujarat, Tamil Nadu, West Bengal, and Himachal Pradesh.

They have a rosette of dark green, glossy leaves that arise from the base. The plant forms a compact clump with multiple stems that can reach a height of around 30 to 60 cm.Cut flowers of gerbera are in high demand due to their vibrant colors, long vase life and use in various floral arrangements. Apart from their use in floral arrangements, gerbera flowers are often used in weddings, special events, and decorations. Gerbera is having single, semi double and double flowers.The colour variation, their meaning, size of flowers, prolonged vase life and wide adaptability makes gerbera a flower of choice for commercial cultivation in India.

As this crop is highly commercial and needs lot of investment, growing under normal situation might be resulted in severe losses. Traditional farming is always risky due to the unforeseen climatic conditions and exposure to pests and diseases. Hence, such kind of crops needs to be grown under protected environments (Manisha *et al.*,

2021). Polyhouses are one of the kinds of protected environments which provide controlled environment and improved quality & quantity of produce with long shelf life. Polyhouse helps in getting optimum yields, protection from pests and diseases,and extended growing seasons. It is very economical to grow gerbera in polyhouse.

Open ventilated saw-toothed polyhouse is sufficient for cultivation of gerbera flowerscommercially under tropical and subtropical climatic conditions (Ahlawat*et al*. 2012; Sarmah *et al*. 2014). Light intensity exceeds during day time and the shade net of inner ceiling should be laid to reduce the intensity. During summer season, shade may be created from 9.30 am to 5pm, and, in winter, it should be from 9 am to 4 pm. In cloudy weather, there is no need of shade. The side curtains should remain open from 7 am to 6 pm during summer days, and, in winter, 9 am to 5 pm to facilitate air circulation. Polyhouse must have the provision of 50% shade-net, preferably aluminate or white shade-net to the inner celling. The optimum humidity inside the greenhouse should be 70 -75%. For maintaining the proper humidity, there should be the provision of fogger which can be operated as and when required. Drip irrigation should be there with the provision of fertigation. The opening of ventilation should be covered with 40 mesh insect-proofnet. Further, automation can be done in a closed polyhouse with the provision of fan-pad cooling system. There is also scope for adoption of IoT for regulating soil moisture, air temperature and humidity in closed environment of a polyhouse (Maitra *et al.* 2020).

Therefore, the present investigation was carried out with an objective to find out total cost of cultivation of gerbera along with its profitability when they were grown under naturally ventilated polyhouse.

MATERIAL AND METHODS

An experiment was carried out in the field allotted to Department of Horticulture, College of Horticulture, SKLTSHU, Hyderabad during the year 2015-16. The experiment comprising ten different varieties of gerbera *viz.,* Balance, Stanza, Savannah, Dana Ellen, Goliath, Primerose, Helix, Liberty, Sabrina and Montenegro wereselectedfor cultivation under naturally ventilated polyhouse. Gerbera plants were transplanted when the plant crown should be above 1- 2 cm soil level without disturbing the root ball.Two rows are planted on one bed with spacing 30×30 cm and theexperiment was laid out in Randomized Block Design (RBD) with three replications. The plants were maintained under uniform cultural practices. Due to daily irrigation, the gerbera bed surface becomes hard, and hence raking of soil was done twice a month as it increases soil aeration.Removing of old, dry, infected leaves from the plant should be done. It helps in keeping the disease and pest infestation

below the economic threshold level (ETL). After 30-45 days of gerbera planting, the plantation buds initially started, but this bud is of inferior quality. Hence, this bud is removed from the base of the flower stalk. This disbudding helps in making the plant strong and healthy. This operation was carried out up to 80 -85 days.The first flowers are harvested after 12-14 weeks (85-90 days) after planting. Harvesting was done in morning hours when the good gerbera flower has a stalk length is 45-55cm, and the diameter of the flower is 10 -12cm.Harvested flowers were kept in a bucket containing clean water.

The total costs incurred and returns were calculated based on CACP methodology of estimation of cost of cultivation. In general, perennial flower crops having two types of costs*viz.*, establishment costs and maintenance costs. Establishment costs include all the expenses incurred during pre-flowering period such as polyhouse construction, seed bed preparation, soil sterilization, FYM application etc. Maintenance costs include expenses incurred on human labour, irrigation, fertigation, fertilizers, chemicals etc during process of cultivation. Amortization method was used to include establishment costs of polyhouse with economic life span of 10 years and planting material cum seed bed preparation with life span of 3 years. The amortized cost was included in fixed cost items. Variable costs or working capital was taken for every year.

Total Fixed Costs (TFC): It includes costs incurred on construction of sheds, interiors, implements, permanent seed bed and amortized costs on establishment capital.

Total Variable Costs (TVC): It includes costs incurred on plants, fertilizers, labour wages, chemicals etc.

Amortization: Crops like gerbera which needs to be grown in controlled environments like polyhouses needs initial establishment costs on construction of polyhouse. The initial establishment costs are included in cost of cultivation and such costs are amortized by using the following formula and included every year till completion of its life span

$$A = \frac{P \times i\ (1+i)^n}{(1+i)^n - 1}$$

Where A = Amortized cost

P = Initial investment made on establishment

i= Rate of interest

n = Economic life span of establishment

Rate of interest was taken as 7 per cent as banks offer agricultural loans at this per cent.

Benefit Cost Ratio(BCR): It is worked out by dividing gross returns with total cost of cultivation of gerbera.

Table 1: Economics of Gerbera Cultivation under polyhouse (1000 m^2) condition

Item of Expenditure	Amount spent (Rs.)
Fixed Cost Rs	
Land	1,00,000
Polyhouse @ 1000m^2	6,00,000
Irrigation system	1,00,000
I. Amortized cost	1,13,814
Recurring cost	
A. Planting material @30/-plant	1,87,500
B. Bed preparation	
Fym	45000
Sand	25000
Soil	1,50,000
Excavation	3750
Labour cost	16250
Fertilizers	1500
Total B	241500
Total A+B	429000
II. Amortized cost of A & B	**160409**
Working capital	
C. Soil sterilization	15000
D. Management cost	
Harvesting & Packing of flowers	75,000
E. Fertilization & Pesticides	40,000
III. Total of Working capital (C+D+E)	120000
Total Cost of Cultivation (I+II+III)	394223
IV. Output	
Flower production (40/plant/year)	2,50,000
V. Income or Gross Returns	
Income from sale (Rs 3.5/flower)	8.75 lakh
BCR	2.22

RESULTS AND DISCUSSION

From the table 1, it was clearly indicated that the total cost of establishment of polyhouse of area 1000 m^2 was Rs. 800000 as gerbera crop should begrown under controlled environment. The land value taken hypothetically as 1 lakh and it varies according to the location of construction. Generally, the economic life span of polyhouse was about 10 years. Construction of polyhouse along with shades, irrigation systems *etc* needs initial investment only and thereafter only maintenance

costs are there. Hence, this establishment amount should be amortized to be included in the total cost of cultivation of gerbera. The amortized cost was Rs. 113814. Similarly, gerbera cultivation needs established planting material and seed bed which could be used continuouslyfor three years. The establishment cost of both planting material and seed bed materials was Rs. 429000. This amount also needs to be amortized and that cost was Rs. 160409. The total amortized costs of establishment of polyhouse, seed bed, planting materialwereRs. 274223. The management costs of gerbera were Rs. 120000, out of which most of the amount spent on harvesting and packing (Rs. 75000) followed by plant protection (Rs. 40000). Thus, the total cost of cultivation of gerbera per year was Rs. 394223. The number of plants could be grown in 1000 m^2 area were 6250 plants when the spacing was 30×30 cm. The average production of flowers per plant per year was 40. A total of 250000 gerbera flowers were produced from 1000 m^2 area of polyhouse. The average price per flower was Rs. 3.50 which gave an income Rs. 875000. The benefit cost ratio worked out to be 2.22. Sharma *et al.* (2014) also got BCR of above 2 from their study on economics of major flower crops in Himachal Pradesh. The BCR reflected that per each rupee investment on gerbera cultivation, the net returns were about Rs. 1.22. Hence, we can say the gerbera cultivation under polyhouse is economically viable and gave profits to the farmers. The results of Bhosale *et al.*, 2011, Mali *et al.*, 2020, Patil *et al.*, 2021 and Manisha *et al.*, 2021 also proved the economic benefit of gerbera cultivation.

CONCLUSION: From gerbera cultivation economics, we can say that farmers can earn approximately six lakhs per year from 1000m^2 land that is almostfifty thousand per month. With Gerbera cultivation, a farmer earns a profitable income and improves their lifestyle.As there is good demand in the domestic as well as international market,progressive farmers can adopt protected cultivation of gerbera by taking advantage ofsupport from different on-going schemes of central and state governments. Moreover,precision crop management technologies under protected cultivation are also observed
in different parts of the country which needs further research to make them userfriendly and cost-effective.

REFERENCES:

Ahlawat, T.R., Barad, A.V. and Jat, G. 2012. Evaluation of gerbera cultivar under naturally ventilated polyhouse. *Indian Journal of Horticulture.* 69(4): 606-608.

Bhosale, M.Y., Shelke, R.D., Aher, V.K and Shenewad, B.A. 2011. Production and marketing of gerbera cut flowers. *International Research Journal of Agricultural Economics and Statistics.* 2(2): 328-331.

Maitra, S., Shankar, T., Sairam, M. and Pine, S. 2020. Evaluation of gerbera (*Gerberajamesonii* L.) cultivars for growth, yield and flower quality under protected cultivation. *Indian Journal of Natural Sciences*. 10(60): 20271-20276.

Mali, R.R., Chavan, R.V., Bhosale, P.S and Talekar, V.S. 2020. Economic analysis of cut flowers underprotected conditionin Sangli district of Maharashtra. International Journal of Current Microbiology and Applied Sciences. 11 (Special Issue): 817-824.

Manisha, V.V.D., Lavanya, T., Kumari, R.V and Supriya, K. 2021. Economics of gerbera under polyhouse cultivation in Ranga Reddy district of Telangana State. *The Journal of Research PJTSAU*. 49(1&2): 60-64.

Patil, S.N., Sonnad, J.S and Mahajanashetti, S.B. 2021. Financial feasibility and profitability of carnation cut flowers under protected cultivation. *Journal of Pharmacognosy and Phytochemistry.* 10(1): 301-305.

Sarmah, D., Kolukunde, S. and Mandal, T.2014. Evaluation of gerbera varieties for growth and flowering under polyhouse in the plains of West Bengal. *International Journal of Scientific Research.* 3(12):135-136.

Sharma, M., Thakur, R and Mehta, P. 2014. Economic feasibility analysis of major flower crops in Himachal Pradesh state of India. *International Journal of Advanced Research in Management and Social Sciences.* 3(9): 24-40.