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Financial feasibility and profitability of carnation cut flowers under protected cultivation

SN Patil, JS Sonnad and SB Mahajanashetti

Abstract

In Maharashtra carnation is one of the major commercial flower crops cultivated in polyhouses. It is very important to evaluate financial feasibility and profitability of carnation cultivation in polyhouses as a commercial cut flower crop in long run. Hence, the present study was conducted to estimate costs and returns, financial feasibility and profitability of carnation cultivation under protected condition. For the present study a sample of 60 rose cut flowers growers was drawn from Pune and Satara districts. The primary data required for the analysis were collected through pre tested questionnaire by personnel interview of respondents pertained to the agriculture year 2018-19. The budgeting technique was followed for estimating various costs and returns. This paper examined benefit cost ratio, internal rate of return and net present value of carnation cut flower cultivation under protected condition for the evaluation of financial feasibility of investment. The results revealed that, capital investment on construction of carnation polyhouse was ₹36.95 lakhs and the cost of production, gross and net returns per acre for carnation cut flowers were estimated to be ₹46,06,516, ₹77,30,028 and ₹31,23,512. The per cent share of frame work cost (37.02%) in the total capital investment of carnation poly house construction was more. In the cost of cultivation, the share of fixed cost in the total cost was 52.75 per cent and the variable cost was 47.25 per cent. The benefit cost ratio (1.67) of carnation polyhouses was more than unity and the internal rate of return (39.00%) was more than the opportunity cost of capital indicated that, investment on carnation polyhouses is financially feasible and carnation cultivation in polyhouses is profitable agribusiness.

Keywords: Protected cultivation, polyhouse, carnation cut flower, cost, financial feasibility

Introduction

Flower is one of the loveliest objects on the earth. A single flower is a reason of a million of smiles and happiness. Floriculture is the branch of ornamental horticulture concerned with growing and marketing of flowers and ornamental plants as well as with flower arrangement. Today floriculture is becoming a booming industry in the world. Flowers make the best gifts by exchange of flowers and offering on all social occasions. In places of worship they are mostly used. They provide food, perfumes and scents and release anxiety and stress and also convey deepest emotions. In India commercial floriculture has emerged as hi-tech activity-taking place under controlled climatic conditions inside polyhouses which is being viewed as a high growth industry. It is becoming important from the export angle. The new seed policy had already made it feasible to import planting material of international varieties. It has been found that, commercial floriculture has higher potential per unit area than most of the field crops and is therefore a lucrative business. The floriculture industry of India has been shifting from traditional flowers to cut flowers for export purposes. About 3,12,000 ha area was recorded under cultivation in floriculture in 2018-19. Production of flowers is observed 28,65,000 Mt of loose flowers and 8,17,000 Mt of cut flowers in 2018-19 in India. The liberalized economy has given an impetus to the Indian entrepreneurs for establishing export-oriented floriculture units under controlled climatic conditions. The country has exported 19,726.56 Mt of floriculture products to the world for the worth of ₹ 571.02 crore in 2018-19. Maharashtra is leading state in India with 8,500 ha area under protected cultivation. Mainly rose, gerbera and carnation are cultivated in greenhouses among the flowers in Maharashtra. The districts like Pune, Satara, Nasik, Ahmednagar, Sangli, Kolhapur and Nagpur are well known for flower cultivation. Carnation is one of the most popular cut flowers in the world and the highest economic importance in the floriculture industry. In recent years, demand for carnation cut flower is gaining momentum with increasing aesthetic sense and higher socio-economic standard of the people. This was reflected much earlier in Europe, USA and Japan and very recently in India also. In India, the floriculture industry got an appreciable boost during the last two decades due to active patronage from the Government of India. Carnations are excellent for cut flowers, bedding, pots, borders, edging and rock gardens.

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As long-lasting flowers, carnations are very popular as boutonnières, in corsages, bouquets and in a wide range of floral arrangements. These are preferred to roses and chrysanthemums in several exporting countries, due to its excellent keeping quality, wide range of colours, forms, ability to withstand long distance transportation and remarkable ability to rehydrate after continuous shipping. Carnations are popularly favored on special occasions, especially Mother's Day, Valentine's Day, Easter, weddings and Christmas. Carnation is also known as the divine flower. Carnation is one of the important polyhouses flower crop cultivated in Maharashtra. In Western Maharashtra Pune and Satara are the major districts cultivating carnation flowers under protected condition.

Carnation cultivation is profitable for the farmers of Maharashtra due to good income in short period. It is high-value flower crop fetches a good price in marriage and festival season. The protected cultivation of flowers and other high value plants on a commercial scale in big polyhouses got an appreciable boost during the last two decades in India. However, such cultivation was limited to the corporate houses and the erection of polyhouses involved very high financial outlay and technological support.

Over the years, the technology is indigenized to adopt by the Indians. This resulted in the emergence of low-cost polyhouses, the advent of which even the small and marginal farmers are now able to exploit the benefits of protected cultivation. Profitability of such capital-intensive technique is useful for decision making regarding its viability as an agribusiness. Hence, an attempt has been made in this paper to study the profitability of carnation cut flowers under polyhouses in the Pune and Satara districts of Maharashtra by estimating the capital investment in construction of polyhouses, cost of cultivation, cost of marketing and financial feasibility.

Methodology

Study Area

The study was taken in Pune and Satara districts of Maharashtra as both districts are leading ahead of other districts in acreage and production of flowers. A sample of 60 carnation cut flowers growers was drawn through proportionate random sampling from Purandar and Haveli tehsils of Pune district and Satara and Man tehsils of Satara district. The villages having greater concentration of polyhouses under the carnation cut flowers were selected randomly in consultation with the officers of the Department of Agriculture and Horticulture from the selected tehsils. The primary data required on the aspects of profitability, financial feasibility and marketing and their relative costs were collected through pre tested questionnaire by personnel interview of respondents. The data pertained to the agriculture year 2018-19.

Data Analysis

The primary data were analyzed with simple statistical tools viz., percentages and averages. The budgeting technique was followed for estimating various costs and returns of carnation

cut flowers under protected cultivation. To evaluate the financial feasibility of investment benefit-cost ratio, internal rate of return and net present value were employed.

Benefit cost ratio (BCR)

The discounted gross benefit divided by the discounted gross cost. The B/C ratio measures the social equity and economic efficiency of resource utilization from the stand point of the society. A decision of B/C ratio is to accept projects with a ratio above one that is $B/C > 1$. Its formula for estimation is as follows:

$$BCR = \frac{\sum_{t=1}^{t=n} \frac{B_t}{(1+i)^t}}{\sum_{t=1}^{t=n} \frac{C_t}{(1+i)^t}}$$

Where, B_t denotes Benefit (Cash inflow) in year t , C_t denotes cost (Cash outflow) in year t , n denotes investment lifespan, i denotes interest rate and t denotes time measured in years.

Net present value (NPV)

Net present value is the present worth of the net benefits or cash flow stream. Mathematically; the net present value is estimated as follows:

$$NPV = \sum_{t=1}^{t=n} \frac{B_t - C_t}{(1 + IRR)^t}$$

Where, B_t denotes benefit (Cash inflow) in year t , C_t denotes cost (Cash outflow) in year t , n denotes investment lifespan, i denotes interest rate and t denotes time measured in years.

If the calculated NPV is positive it implies the investment is viable, and where the NPV is equal to zero implies that the investment breaks even. The rule with NPV is to accept all mutually exclusive investments with a zero or greater NPV.

Internal rate of return (IRR)

This is the discount rate that makes the NPV of an investment equal to zero, i.e.

$$NPV = \sum_{t=1}^{t=n} \frac{B_t - C_t}{(1 + IRR)^t} = 0$$

Excel was used in estimating the IRR of the identified potential investments. To calculate the IRR using interpolation method, two discount rates are estimated; one that gives small positive NPV and another that gives small negative NPV.

The rule of thumb is that, the difference between the two discount rates should not be more than 5 per cent. The method of interpolation is employed using the formula expressed as:

$$\frac{\text{Internal rate of return} - \text{Lower discount rate}}{\text{Difference between the two discount rates}} \times \frac{\text{Present worth of incremental net benefit stream (cash flow) at lower discount rate}}{\text{Absolute difference between the present worth of cash flow at the two discount rates}}$$

The decision rule is to accept all independent projects having an internal rate of return equal to or greater than the cost or opportunity cost of capital. Specifically, if the IRR is greater than the cost of capital it implies that, the investment is viable, when it is equal to the cost of capital, the project will break even and when smaller than the cost of capital, the investment is not viable.

Result and Discussion

General information about the polyhouses and the produce of sample growers

Cultivation of carnation cut flowers was carried out in two types of polyhouses i.e. GH-1 naturally ventilated and GH-2 partially controlled. The use of GH-1 type of polyhouses was 85 per cent and GH-2 type of polyhouses was 15 per cent indicated that, the use of naturally ventilated type of polyhouses was more in the study area. Majority of polyhouses were erected on medium and light type of soils (Table 1). Polyhouses were not erected on heavy soils as it could be used for other high value crops. The produce was grown on raised bed with drip irrigation system. The growers opined that, the life period of carnation is of 3 years. Carnation cut flowers had a shelf life of 8 to 10 days. The average area under carnation flower polyhouses was 0.14 ha.

Table 1: Information about the polyhouses

Sl. No.	Particulars	Carnation cultivation
1	Poly house type (%)	
	i) GH-1	85
	ii) GH-2	15
2	Soil type (%)	
	i) Light	13
	ii) Medium	87
3	Drip irrigation (%)	100
4	Average area under polyhouses (ha)	0.14

Capital Investment in polyhouses construction

Cultivation of carnation cut flowers under protected condition is highly capital intensive. The capital investment on polyhouses construction depends upon the total area, quality and quantity of steel used; labour cost and additional facilities like shading net, support net, facility unit and irrigation system. The average capital investment on construction of carnation polyhouse was ₹ 36.95 lakhs (Table 2). The per cent share of frame work cost in the total capital investment of poly house construction was higher i. e. 37.02 per cent. Polyhouses structures were erected by all the growers by giving one time contract to specialized agency meant for erection. The life of structure is about 10 to 15 years. However, the poly film, shed net and support net has to be changed once in every three years. Cost of crop support system in carnation poly house construction was 18.62 per cent of the total capital investment. Carnation crop has the

tendency to bend unless supported properly. Due to the weak and succulent stem of carnation cut flower the support net is required for the supporting and training to the stem. Due to the provision of this metal support net, stem of carnations remains straight and vertical during the growth period. Hence support has given by metallic wire woven with nylon mesh in all carnation poly houses termed as crop support system. At every nearby two meters wire was supported with iron poles. If the net support is not provided the stem grows zigzag and do not fetch better prices in the market. Hence in case of carnations polyhouses fixing of metal net support is essential. The growers opined that, the life period of crop support system and irrigation system is 10 years. The costs for Irrigation system and poly film were more or less same. The cost of facility unit was 5.01 per cent. The other costs were 17.45 per cent of the total capital investment, which included the labour cost, cost of light arrangement, dripper, bed, taxes and miscellaneous expenses. The cost of machinery and equipment was 2.81 per cent of the total capital investment.

Table 2: Capital Investments in construction of carnation polyhouses per acre

Sl. No.	Particulars	Cost (₹ lakh)	Percentage to total
1	Framework	13.68	37.02
2	Polyfilm	2.73	7.39
3	Shade net	0.69	1.87
4	Support net	0.33	0.89
5	Facility unit	1.85	5.01
6	Machinery and equipment	1.04	2.81
7	Irrigation system	3.31	8.96
8	Crop support system	6.88	18.62
9	Other costs	6.45	17.45
	Total	36.95	100.00

Cost of cultivation

As depicted in Table 3, the cost of cultivation of carnation cut flower in polyhouses was worked out to ₹35,45,576. The share of fixed cost in the total cost was 52.75 per cent which included mainly rental value of land, depreciation on machinery and equipment and interest on investment. The most important item of fixed cost in the total cost was rental value of land which amounted ₹12,88,276 (36.34%). Normally the polyhouses owners use their own land and therefore they are not required to pay rent of land, directly. As per method of estimation of cost of cultivation for crops, the 1/6 value of gross produce is taken as a rent of crop. Since the value of carnation flowers produced is high the rental value also turns out to be high. It should be very clear that, rental value is imputed value. The cut flower growers do not pay from their pocket towards this item. However, the methodology for estimation of cost directs to estimate for these costs.

Table 3: Cost of cultivation (₹/acre)

Sl. No.	Particulars	Cost (₹)	Percentage to total cost
A	Fixed cost		
1	Depreciation	4,50,980	12.72
2	Interest on investment	1,30,962	3.69
3	Rental value of Land	12,88,276	36.34
	Total (A)	18,70,218	52.75
B	Variable costs		
1	Bed preparation and fumigation	98,206	2.77
2	Planting material	3,38,333	9.54
3	Cost of hired human labour	5,44,274	15.35
4	FYM cost	1,00,733	2.84
5	Fertilizer cost	2,82,120	7.96
6	Electricity charge	17,764	0.50
7	Water bill and maintenance cost	12,864	0.36
8	Cost of plant protection chemicals	1,40,361	3.96
9	Repairing cost of equipments and machineries	16,006	0.45
10	Incidental and other charges	29,628	0.84
11	Land revenue	237	0.01
12	Interest on working capital	94,832	2.67
	Total (B)	16,75,358	47.25
C	Total cost of cultivation (A + B)	35,45,576	100.00
D	Total output (No.)	10,06,514	-
E	Per flower cost of cultivation		
1	Fixed Cost	1.86	-
2	Variable Cost	1.66	-
	Total Cost	3.52	-

The variable cost accounted 47.25 per cent of the total cost. The major items of variable cost comprising of hired human labour, fertilizer cost, cost of plant protection, FYM cost, cost of bed preparation and fumigation, interest on working capital, cost of planting material and water bill and maintenance (irrigation) charges. Among these, cost of hired human labour accounted 15.35 per cent of the total cost. This indicated that, carnation cut flower cultivation was labour intensive as weeding, harvesting, pinching, disbudding, grading and packing operations were performed manually. Expenditure on fertilizers and pesticides constituted 11.92 per cent of the total cost. Cost of bed preparation, fumigation and interest on working capital collectively constituted 5.44 per cent. Cost of planting material alone accounted 9.54 per cent. Variable inputs such as electricity bill, incidental and other charges, repairing of equipment and machineries, water bill and maintenance and land revenue accounted very less i.e. less than 1 per cent of the total cost. The cost of cultivation of single carnation cut flower was ₹3.52. It was observed that, per flower cost of carnation cut flower cultivation at variable cost was low and it was more at fixed cost.

Cost of marketing

The cost of marketing of rose cut flowers in polyhouses was worked out to be around ₹10,60,940 (Table 4). The commission of commission agents shared 55.02 per cent. The cost of grading and packaging shared 28.46 per cent followed by transportation cost (12.74 per cent) and other expenses (3.78 per cent) in total cost of marketing.

Table 4: Cost of marketing

Sl. No.	Particulars	Amount (₹)	Percentage to total
1	Grading and packing cost	3,01,954	28.46
2	Transportation cost	1,35,113	12.74
3	Commission charges	5,83,778	55.02
4	Other expenses	40,095	3.78
	Total	10,60,940	100.00

Profitability of carnation cut flowers under protected cultivation

The Table 5 presents the data on output, costs, returns and results of financial analysis viz, benefit cost ratio, internal rate of returns and net present worth.

Table 5: Profitability of carnation cut flowers under polyhouses

Sl. No.	Particulars	Amount (₹)
1	Cost of cultivation (₹ /acre)	35,45,576
2	Cost of marketing	10,60,940
3	Cost of production (₹ /acre) (1) + (2)	46,06,516
4	Cost of production per flower	4.58
5	Output per acre (No.)	10,06,514
6	Flower price realized (₹ /flower)	7.68
7	Gross returns (₹ /acre)	77,30,028
8	Net returns (₹ /acre)	31,23,512
9	Net returns (₹ /flower)	3.10
10	B:C ratio	1.67
11	NPV (₹)	39,48,352
12	IRR (%)	39.00

The average output per acre of carnation cut flowers was of nos. 10,06,514. The cost of production, gross and net returns per acre for carnation cut flowers were estimated to be ₹46,06,516, ₹77,30,028 and ₹31,23,512. Single carnation cut flower price realized was ₹7.68. An average net return per carnation cut flower was of ₹3.10.

Financial feasibility of carnation cut flowers indicated that, NPV at 15 per cent discount rate was found to be ₹39,48,352 which was an absolute measure by discounting the net cash inflows. The B: C ratio was 1.67 which was more than unity indicated the worthiness of investment. The internal rate of return was 39.00 per cent which was higher than the interest rate, which the producers could borrow from lending agencies and invest on these units. In other words, it is the average earning power of money invested on rose cut flowers cultivation in polyhouses during its lifespan. Since IRR was

more than the opportunity cost of capital, it clearly indicated that, investment on carnation polyhouses is financially feasible.

Conclusions

- The use of GH-1 type of polyhouses was more in carnation cut flower cultivation. Cultivation of carnation cut flowers under protected condition is highly capital intensive. Therefore, evolving low cost polyhouses/structures will go a long way to boost production of carnation cut flowers under protected cultivation. The per cent share of frame work cost (37.02 per cent) was higher in the total capital investment of carnation poly house construction followed by cost of crop support system (18.62 per cent).
- The cost of cultivation of carnation cut flower in polyhouses was worked out to ₹35,45,576. In this, the share of fixed cost in the total cost was 52.75 per cent and the variable cost was 47.25 per cent. The most important item of fixed cost in the total cost was rental value of land (36.34 per cent) followed by depreciation (12.72 per cent). The major items of variable cost were cost of hired human labour, fertilizer cost, cost of plant protection and FYM cost. Among these, cost of hired human labour accounted 15.35 per cent of the total cost indicated that, carnation cut flower cultivation was highly labour intensive which requires skilled and unskilled labours. Therefore, effort should be made by the state and other stakeholders to promote this enterprise in areas where unemployment is rampant.
- Per flower average cost of cultivation of carnation cut flower at variable cost was low and it was more at fixed cost. In the cost of marketing of carnation cut flowers, the commission of commission agents shared more than 50 per cent followed by cost of grading and packaging which was shared 28.46 per cent. There is need to control private commission agents to minimize the cost of marketing of carnation cut flowers.
- The benefit cost ratio (1.67) of carnation polyhouses was more than unity and the internal rate of return (39.00%) was higher than the interest rate indicated that, investment on carnation polyhouses is financially feasible and carnation cultivation in polyhouses is profitable agribusiness. Therefore carnation cut flowers should be cultivated on large area.

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