



## Cost-Benefit And Sensitivity Analysis Of Rose Vis-À-Vis Other Floriculture Crops In Open Cultivation In Vidarbha.

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### ABSTRACT

Floriculture industry is booming in the world. Most of the farmers adopt floriculture as a primary source of income with traditional cropping system. The study is about to determine the profitability of cut flower roses cultivated under open cultivation vis-à-vis Marigold, Tuberose, Chrysanthemum and Gaillardia. And study the breakeven quantity and sensitivity analysis of cut flower roses and work out the economics of floriculture plants under open condition. So that the cultivators analyze the net returns from these crops and motivate towards adoption of these floriculture cultivation as a primary source of income in Vidarbha region.

**KEYWORDS :** Floriculture, Vis-à-vis, adoption, Benefit-cost ratio, break even quantity.

### Introduction:

Maharashtra is one of the leading flower producers in the India. The state has varying soil types and agro-climatic conditions, which offer tremendous scope for floriculture. District like Pune, Nasik, Aurangabad, Sangli, Satara, Kolhapur, Thane and Nagpur are well known for flower cultivation. Pune, Satara, Sangli, Kolhapur and Nasik are well developing hi-tech floriculture district. Whereas, Pune, Thane, Nasik, Ahmednagar, Nagpur and Nanded are famous for open flower cultivation. The principal flowers grown in Maharashtra are marigold, rose, tuberose, chrysanthemum, gladiolus, Marigold, jasmine, kagda, mogra, gerbera, carnation etc.

Maharashtra state having four major areas i.e. Western Maharashtra, Vidarbha, Marathwada and Kokan. There is great deal of variation in rainfall in the state and agriculture is mainly rain fed. The state has an average rainfall about 100 cm. The Western Ghats, Kokan, Thane, Ratnagiri, receive 300cm rainfall, areas like Nasik, Pune, Ahmednagar, Beed, Nanded and Usmanabad get 75 to 100 cm rainfalls while in Vidarbha region districts like Nagpur, Amravati, Yavatmal, Buldhana, Akola, receiving about 75 cm rainfalls.

The state has varied type of soil i.e. red, late-rite, black, alluvial soil. The red soil is exclusively prevalent in Western Ghats and Coastal areas. Whereas, the other types of soil are prevalent almost in all region of the state. Only about 16.8 per cent of its cultivable land being irrigated as compared to the national average of 33 per cent. And more than 70% farmers are marginal farmers (farmers having less than 1 hectare area under cultivation). Maharashtra's agro-climatic condition feverous promotion of less water intensive crops like horticultural crops mainly fruits. Progressive farmers adopted micro irrigation system with hi- technique. It estimated that even if the irrigation potential were completely utilized around 60-70 per cent of net sown area in the state would continue to remain depend on rain. The alternative to sustain agriculture and enable this sector to make a positive contribution to the state as the nation income is to diversity the cropping pattern into high value crops. Both the State as well as the Central Government has recognized this, recently. The idea that agricultural export expanded through greenhouse floriculture is desirable and identified it is successful. Many studies found that, the floriculture production, domestic consumption and export increased continually. The past study concluded that, even a holder of very small area could derive benefits from flower cultivation as compare to other ordinary crops. Maharashtra's soil, topography and climate shows a definite potential and scope for various horticultural crops. A number of horticultural development programmes have launched by the state, namely the National Horticulture Mission(NHM) and other various Government Schemes, along with productions and export intensives.

Maharashtra state is having highest number of green houses in the

country but mostly in western Maharashtra districts like Pune & Ahmadnagar. In Vidarbha region the Hi-tech cultivation of floriculture is below 5% & very less as compared to other regions of Maharashtra but the present flower cultivation satisfies the local demand which has been used for worshipping & other occasions such as marriage etc. Most of the flowers have been cultivated in open cultivation and according to area Rose has been the important one followed by Marigold, Tubeose, Gillardia & Chrysanthemum. The paper Intends to study the Profitability, break even cost of production and sensitivity of these flowers. So, that proper planning could be done for growth and sustainability in this sector. In this view, Khadwa, Darwha, Karalgaon & Bhari villages have been chosen from Nagpur, Yavatmal, Amravati districts respectively for this study.

### Objectives of the study:

1. To determine the profitability of cut flower roses cultivated under open cultivation vis-à-vis Marigold, Tuberose, Chrysanthemum and Gillardia.
2. To study the breakeven quantity and sensitivity analysis of cut flower roses.
3. To work out the economics of selected commercial flowers in open cultivation.

### Methodology:

#### Sampling technique:

A proper questionnaire is prepared for collecting data in which all questions related to farmer's family covers all the aspects related to their economic status are covered. From house listing schedule it has been found that 73.00 percent the marginal farmers own 95 per cent, 2.30 percent and 2.70 per cent of own land, leased-in land and leased-out land respectively among total operational holdings. Out of the total operational holding under floriculture cultivation 31.41 per cent land has been put to rose(cut flower) cultivation and of which 31.25 per cent is under Tuberose cultivation. Only 37.06 per cent have under Gillardia & Marigold cultivation.

### Analytical Approach:

#### Cost Of Cultivation of Floriculture:-

The evaluation of the cost of cultivation of selected floriculture plants in green house and under open cultivation has been worked out by following cost considerations.

A. Cost A = All the variable c

The variable items included under cost A are considered as under:

1. Hired human labour.
2. Bullock labour.
3. Seeds/ Floriculture planting material.
4. Manures
5. Fertilizers

- 6. Plant protection measures.
- 7. Irrigation
- 8. Land revenue
- 9. Miscellaneous.
- 10. Interest on working capital.
- B. Cost B = Cost A + Interest on fixed capital + Rental value of land.
- C. Cost C = Cost B + Imputed value of family labor.

**Profitability:**

The measure of profitability of cut roses has been a very important measure in agriculture business to make a comparison between the floricultural crops with roses. To

arrive at the profitability of cut flowers factors like area, yield (number of cut flowers), production cost (including fixed and variable cost), returns (gross income), benefit (net income) and B/C ratio etc. have been taken. The production cost has been the sum of input and output cost.

**Break-even analysis:**

Break-even analysis has been taken to find the quantity where a farm gets no loss no profit situation. Here breakeven quantity (BEP) of open field cultivation has been compared with greenhouse roses. BEP quantity measure done such as below:

$$BEP (quantity) = F / (P - V) \text{-----} (1)$$

Where:

F = Per ha. Fixed investment (Rs.),

P = Per flower average price (Rs.) and

V = Average variable cost per flower (Rs.).

In this methodology break-even quantity of production of rose, hibiscus and jasmine in open field cultivation have been done to find the no loss no profit or normal profit condition of the farmer.

**Sensitivity analysis:**

The sensitivity concept has been employed to examine the sensitivity of the average cut flower grower towards risk and uncertainty of increase in production cost, reduction in yield and reduction in price of flowers, under existing prices, cost and price structure.

Sensitivity analysis has been done to find the difference between increase or decrease and actual cost, yield (number of flowers) and price respectively for the rose and another floricultural cultivation. This has been another important measurement to check the market situation. The estimated cost, yield and price has been derived as per following:

(i) Estimated cost = Actual yield × Actual price

(ii) Estimated yield = Actual cost/Actual price

(iii) Estimated price = Actual cost/Actual yield

**Results & Discussion:**

**Cost of cultivation of flowers:**

With the purpose of comparative study of relative Cost considerations in respect of proposed flowers viz; Rose, Tuberose, Chrysanthemum, Marigold and Gaillardia, the Cost 'A', Cost 'B' and Cost 'C' per Sq.m a..rea has been worked out. The details are given in table.

**Table 1 : Comparative Analysis of Cost A, Cost B and Cost C of Selected Flowers in open Cultivation.**

Sr. No.	Expenditure on Cost/Sq.m Area	Rose	Tube rose	Mari gold	Giall ardia	Chrysan themum
I	Cost A... Rs./Sq.m	51.97 (100%)	18.89 (36.34%)	10.68 (20.55%)	11.68 (22.47%)	11.04 (21.24%)
II	Cost B... Rs./Sq.m	79.23 (100%)	33.16 (41.85%)	20.55 (25.93%)	18.27 (23.05%)	24.09 (30.40%)

III	Cost C... Rs./Sq.m	80.23 (100%)	34.16 (42.57%)	21.55 (26.86%)	19.27 (24.01%)	25.09 (31.27%)
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As seen from table No-1 Cost A, Cost B, and Cost C per Sq.m area in the process of growing of Roses is highest in comparison to other flowers. Therefore for comparison sake the Cost 'A', cost 'B' and Cost 'C' incurred for growing Roses, under open condition for per Sq.m area has been treated on 100% basis.

In this respect, it is seen that for growing of roses under all concerned open units taken together, the Cost A, Cost B, and Cost 'C' for per Sq.m area is respectively Rs. 51.97, Rs. 79.23, Rs. 80.23. Followed by Roses., the Cost structure analysis shows that for growing of tuberose under open conditions in all concerned units, the Cost 'A' per Sq.m area is Rs. 18.89 which is 36.34% of Cost 'C' incurred for roses. Whereas, Cost 'B' for tuberose /Sq.m area amounts to Rs. 33.16, which is 41.85% of Cost 'B' incurred for Roses. In case of Cost 'C', it is seen that it is Rs. 34.16 for tuberose/Sq.m area which 42.57% of Cost 'C', incurred for roses.

The comparison between Roses and chrysanthemum flowers it is seen that Cost 'A' incurred for grown chrysanthemum /Sq.m area amounts to Rs. 11.04 which is 21.24% of Cost 'A' incurred for roses. The comparison of Cost 'B' between chrysanthemum and Roses shows that the Cost 'B' for chrysanthemum has incurred Rs. 24.09 which is 30.40% of Cost 'B' incurred for Roses. Cost 'C' indicates that it is Rs.25.09 for growing chrysanthemum in Sq.m area which is 31.27% of Cost 'C' incurred in the growing of Roses.

The comparison between Roses and Marigold shows that the Cost 'A' for growing of Marigold in one Sq.m. area in open condition amounts to Rs. 10.68 which is 20.55% of Cost 'A' incurred for Roses. In case of Cost 'B' it is seen that the Cost B/Sq.m area for Marigold under open condition amounts to Rs. 20.55 which is 25.93% of Cost 'B' as incurred for Roses. In respect of Cost 'C' it is seen that flowers of Marigold have involved cost of Rs. 21.55 for growing them in 1 Sq. m area which is 26.86% of Cost 'C' incurred for Roses.

In case of flowers of gaillardia, it is seen that it is Rs.11.68for per Sq.m area which is 22.47% of Cost 'A' involved for growing roses. The Cost B for gaillardia amounts to Rs. 18.27/ Sq.m, which is 23.05% of Cost 'B' which is incurred for roses. In case of Cost 'C' it is seen that for growing gaillardia/Sq.m Cost 'C'; amounts to Rs.19.27 which is 24.01% of Cost 'C' which is incurred for roses.

Critical analysis of the said Cost structure indicates that Cost A which includes all recurrent variable items is highest for rose which is respectively followed by tuberose, chrysanthemum, gaillardia and Marigold. Analysis of Cost 'B' indicates that it is highest for roses like Cost 'A', which is respectively followed by tuberose, chrysanthemum, Marigold and gaillardia.

This analysis of costs shows that Cost 'C' is also highest for growing of Roses which is respectively followed by tuberose, chrysanthemum, Marigold and gaillardia.

It is to be critically argued that in the process of growing of floriculture, expenditure on variable items which constitute Cost 'A' matters the most. In the context, it is seen that Cost A/Sq.m is highest for rose which is respectively followed by Tuberose , Chrysanthemum ,Gaillardia and Marigold.

**Profitability of Flowers:**

Among the flower cultivator's area under Rose has been higher than other flowers followed by Gaillardia, Tuberose Chrysanthemum & Marigold . The flower wise total produce and receipt are described as under.

**Table 2: Flowerwise Total produce, Total Receipt and Receipt/Sq /m, from Flowers Grown under Open Condition.**

Sr.No.	Flowers Grown	Total Area of All Units under Flowers in (Sq.m)	Plant population with distance in Sq.m	Yield obtained in No/Kg	Rate of sale/No/Kgs	Total receipts in (Rs.)	Receipt from Sq.m area
1	Rose	26,000.00	96,296 (60x45)	38,51,840 flower	1 Rs/flo	3851840.00	148.14
2	Tuberose	12,000.00	1,99,999 (30x20)	11,999.94 kg	80Rs/Kg	9,59,995.20	79.99
3	Chrysanthemum	4,000.00	44,444 30X30cm.	10,000 Kgs	30Rs/kg	3,00,000.00	75.00
4	Marigold	2,000.00	22222 (30X30)	2240Kg	50Rs/kg	1,12,000.00	56.00
5	Gaillardia	24,000.00	2,00,000 (30X40)	43,200 Kg	20 Rs/kg	8,64,000.00	36.00

**Table 3: Flowerwise Net Return over Cost A, Cost B and Cost C per Sq.m area for selected flowers Grown under Open Conditions.**

Sr. No.	Name of Flower	Revenue Receipts/Sq.m	Cost A/Sq.m area (Rs)	Cost B/Sq.m area (Rs)	Cost C/Sq.m area (Rs)	Cost A (Rs)	Cost B (Rs)	Cost C (Rs)
1	Rose	148.14	51.97	79.23	81.15	96.17 (2.85)	68.91 (1.86)	67.91 (1.82)
2	Tuberose	79.99	18.89	33.16	35.16	61.1 (4.23)	46.83 (2.41)	44.83 (2.27)
3	Chrysanthemum	75	11.04	24.09	26.59	63.96 (6.79)	50.91 (3.12)	48.41 (2.82)
4	Marigold	56	10.68	20.55	25.55	45.32 (5.24)	35.45 (2.72)	30.45 (2.19)
5	Gaillardia	36	11.68	18.27	20.77	24.32 (3.08)	17.73 (1.97)	15.23 (1.73)

As seen from table 3, revenue proceeds from roses cultivated under open condition in an area of 1 Sq.m amount to Rs. 148.14. Since the Cost A, Cost B and Cost C incurred for growing of roses under open condition in the Sq.m area amounts to Rs. 51.97, Rs. 79.23 and Rs. 81.15 respectively, the net return from roses grown in an area of 1 Sq.m over Cost 'A' amounts to Rs.96.17 and net return over Cost B and Cost C for the said area respectively amounts to Rs. 68.91 and Rs. 67.91

The critical observations reveal that net return from roses in 1 Sq.m area which are grown in open conditions is 2.85 times more over Cost A, which is more by 1.86times over Cost 'B' more by 1.82 times over cost C.

In case of tuberose grown under open condition, it is seen that revenue receipts from/Sq.m area under it amounts to Rs. 79.99. Since the Cost A, Cost B and Cost C incurred for growing tuberose in per Sq.m area amounts to Rs. 18.89, Rs. 33.16, Rs. 35.16 respectively return from of tuberose under open condition in one Sq.m are respectively amount to Rs. 61.10, growing over Cost A Rs. 46.83 over Cost B and Rs.44.83 over Cost C. Critical observation reveal that net return over Cost A from tuberose is 4.23 times more over Cost A, which respectively more by 2.41 times over Cost B and 2.22 times more over Cost C.

In case of chrysanthemum, the revenue receipt from its growing under open condition in an area of 1 Sq.m amounts to Rs. 75.00. Since, the Cost A, Cost B and Cost C incurred for growing chrysanthemum

in the said area of 1 Sq.m each respectively amounts to Rs.11.04, Rs. 24.09 and Rs. 26.59 net return from 1 Sq.m area under chrysanthemum is 6.79 times moreover Cost A 3.12 times more over Cost B and 2.82 times more over Cost C.

The study relating to Marigold shows that revenue receipt amount to Rs. 56.00 from its growing in 1 Sq.m. Since, the Cost A, Cost B and Cost C/Sq.m area for Marigold respectively is incurred to the limit of Rs.10.68, Rs.20.55, Rs.25.55 the net return from Marigold in per Sq.m area respectively amounts to Rs. 45.32 over Cost A; 35.45 Rs. Over Cost B and Rs. 30.45 over Cost C. This indicates that net return from growing of Marigold in Sq.m under open condition is 5.24 times more over Cost 'A', 2.72 times over cost 'B', 2.19 times over Cost 'C'.

The revenue receipts for growing of gaillardia in /Sq.m in open condition amounts to Rs. 36. The Cost A, Cost B and Cost C/Sq.m incurred for growing gaillardia since amounts to Rs. 11.68 and Rs. 18.27 and Rs. 20.77 respectively. The net return over Cost A, Cost B and Cost C at the rate growing of gaillardia in 1 Sq.m. respectively amounts to Rs. 24.32 over Cost A Rs.17.73 over Cost B and Rs. 15.23 over Cost C. –

Critical observations reveal that net return from gaillardia grown under open condition is 3.08 times more over Cost A, 1.97 times more over Cost B and 1.73 times more over Cost C/Sq.m. Further, the observations reveal that all the selected flowers viz; rose, tuberose, chrysanthemum, Marigold and gaillardia gave left considerable margin of net return over Cost A, Cost B and Cost C. these observations further reveal that highest net returns per Sq.m over Cost A, Cost B, Cost C is from roses which is followed by net return over these costs from tuberose, Marigold, gaillardia and chrysanthemum respectively.

**Table 4: Profitability of flowers**

Sr.no	Particulars	Rose (No)	Tuberose (kg)	Marigold (kg)	Chrysanthemum (KG)	Gaillardia (Kg)
1	Yeild/ha	1481476	9999.95	11200	25000	18000
2	Production Cost Rs.	811580	351600	255600	265900	207700
3	Returns(Gross Income)Rs.	1481400	799990	560000	750000	360000
4	Net Income(Rs.)	669820	448300	304400	484100	152300
5	B/C Ratio.	0.82	1.27	1.19	1.82	0.73

Among the flower cultivator's area under rose has been higher than other flowers. Per hectare production of rose, tuberose, marigold, Chrysanthemum and Gaillardia has been 1481476 (no), 9999.95Kgs, 11200Kgs, 25000Kgs and 18000 (Kg) respectively. Per hectare cost of production cost has been highest for rose followed by tuberose, chrysanthemum, Marigold & Gaillardia respectively. The gross income per hectare has been Rs. 1481400 followed by tuberose (Rs. 7,99,990), Chrysanthemum (Rs. 750,000), Marigold (Rs5,60,000) and Gaillardia (Rs.360,000).

Net income from Rose has been highest (Rs.6,69,820) followed by chrysanthemum (Rs.4,84,100), Tuberose (Rs. 4,48,300), Marigold (Rs.3,04,400) and Gaillardia (Rs.1,52,300). Gross and net income for Rose has been higher than all other flowers because of low cost involved in procuring planting material, cost fertilizers and plant protection chemicals. Moreover, Rose flower production has been available throughout the year: Benefit-cost been highest for Chrysanthemum, followed by tuberose & Marigold.

**Break Even Analysis:**

It has been found the break even quantity of roses 3521 numbers in terms of fixed investment of Rs.5,19,710 for per sq.m. flowers price of Rs. 148.14 and per hectare

variable cost Rs. 8,11,580. The break even quantity for Tuberose has been 249.5Kg in terms of fixed investment Rs. 1,88,990 for per sq.m. flowers at a price of Rs. 79.99 and per

unit of variable cost Rs.3,51,600. The break even quantity for Marigold has been 351.1Kg in terms of fixed investment Rs. 1,06,890 for per sq.m. flowers at a price of Rs. 56.00 and per

unit of variable cost Rs.2,55,600. The break even quantity for Chrysanthemum has been 228.17Kg in terms of fixed investment Rs. 1,10,460 for per sq.m. flowers at a price of Rs. 75.00 and per unit of variable cost Rs.2,65,900. Lastly, the break even quantity of Gaillardia has been 548.5 kgs. For Rs. 83536.66of fixed investment and a price of Rs. 36.00 per kg. of flowers and per unit of variable cost Rs. 2,07,700. By producing this quantity of flowers the farmer should face no profit no loss situation. Details have been given in Table 5.

**TABLE 5—BREAK-EVEN ANALYSIS OF CUT FLOWERS**

Sr No.	Type of flower	Flower production in No or Kgs	Total fixed investment Per Ha. In Rs.	Price received per Sq.M. in Rs.	Variable Cost in (Rs) per Ha.	Break-even quantity (No/Kgs of flower)
1	Rose	1481476 cuts.	519710	148.14	811580	35210 cuts
2	Tuberose	9999.95Kg	188990	79.99	351600	2495kg
3	Marigold	11200 Kg	106890	56.00	255600	3511kg
4	Chrysanthemum	25000 kg	110460	75.00	265900	22817kg
5	Gillardia	18000 Kg	83536.66	36.00	207700	5485kgs

**Sensitivity analysis:**

In this section analysis has been done to know how much cut flower growers have been satisfied in the above range of cost, yield and prices. Highest difference between actual and increase cost has been found for the Rose Rs. 6,69820. Yield differences have been higher in Chrysanthemum 45515kg. The difference between actual and increase of price among flowers are higher in roses followed by chrysanthemum ,tuberose, marigold and gaillardia respectively. This sensitivity analysis has been clearly shown. In all type of flowers it has clearly observed that the farmer get positive results for increasing cost, yield and price as because they got the positive amount of production than break even quantity of production. Details have been given in Table 6.

**Table 6 – Sensitivity analysis.**

Sr. No	Particulars	Rose	Tuberose	Marigold	Chrysanthemum	Gillardia
1	Cost- Actual(Rs)	811580	351600	255600	265900	207700
	Increased(Rs)	1481400	799900	560000	750000	360000
	Difference(Rs)	669820	448300	304400	484100	152300
2.	Yield- Actual	1481476cuts	99999.95kg	11200kg	25000kg	18000kg
	Increased	271044cuts	22750kg	24538kg	70515kg	31198kg
	Difference	122568cuts	12750.05kg	13338kg	45515kg	13198kg
3.	Price – Actual(Rs)	81.15	35.16	25.56	26.59	20.77
	Increased(Rs)	148.14	79.99	56.00	75.00	36.00
	Difference(Rs)	66.99	44.83	30.44	48.41	15.23

**Conclusions :**

In spite of the fact that rose has been the major floriculture crop in

these districts its cultivation has been preferred mostly by the farmers due to its profit margin per sq.m. and production throughout the year. But most of the farmers have taken rose cultivation as a secondary occupation. Area of roses has been higher than other floricultural crops and its production and net income have higher than others. But the benefit-cost ratio of Chrysanthemum has been higher than other floriculture crops in this study , thus its profitability has been higher than rose, tuberose, marigold & Gaillardia. Break-even quantity and sensitivity analyses of cost, yield (production) and price have been positive for all crops.

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