

Analysis of Hi-tech Cultivation as an Innovative Method for Floriculture in Vidarbha

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Abstract Floriculture is the fast emerging & high competitive industry in India with the annual growth rate of 8 to 10%. The global demand of flowers is increasing day by day worldwide. Vidarbha is a rain fed region with high temperature climate. Due to this climatic condition Hi-tech or protected cultivation is highly recommended. Hi-tech cultivation refers to cultivation under controlled temperature and protected condition which gives 3 to 10 times more production than that of open cultivation. The main objective of the study is to motivate farmers in Vidarbha towards Hi-tech cultivation and floriculture produce.

Keywords: *Hi-tech, temperate, motivate, marginal farmers, strategy evaluation of produce*

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1. Introduction

Floriculture is a fast emerging and high competitive industry in India, as the global demand for flowers is rising at a pace of 8 to 10 percent [5] which cannot be completely met by the present major players. In years to come, India can and must grab on such an opportunity. With production in traditional areas such as the Netherlands and USA reaching threshold level, the countries like Columbia, Israel, South Africa and Kenya have emerged as the new production centers. India needs to start the emerging opportunities by adopting Hi-tech (protected) cultivation like European and other countries. The trend of floriculture is changing with the continuous introduction of new cultivators and new species, cultural techniques are changing and hence new products and technologies are developing. There is a sea change in trends of consumer, new generation of growers is coming forward to employ modern technology for maximizing production and offer quality produce for consumer acceptability, thus fetching best price by adopting Hi-tech cultivation.

The word Hi-tech cultivation means cultivation under protected condition in green house, polyhouse, shed net etc. In temperate region where climatic conditions are extremely adverse, man has growing some high value crop continuously by providing protection from the excessive cold or excessive temperature which is called Hi-tech cultivation.[1] Hi-tech is a technique of favorable environment condition to the plants. It is also of vital importance to create an ideal micro climate around the plants. In green house/ poly house one can grow any plants in any place at any time by providing suitable environmental condition with minimum labor. The main

advantage of floriculture under Hi-tech cultivation is that the yield obtained is 8 to 10 times more than that of outdoor cultivation, depending upon the type of green house, type of crop and environmental control facilities. The reliability of crop increase under green house cultivation with year round production, disease free and genetically superior transplants can be produced continuously and the most important part is water requirement of crops very limited and easy to control for floriculture produce [4].

Income & capital return under green house or in Hi-tech cultivation:

The yield under polyhouse cultivation can be achieved to the level of 5-8 times as compared to the open crop cultivation. Various trials conducted at agro research centers in northern India indicate that cut flowers like Carnations, Gerbera, Lilly, Rose, Orchids, antherium grown under polyhouses and green houses gives high yield returns and top quality produce throughout the year. While in open cultivation these crops give only 4 month production during winter before start summer. So, the potential of floriculture under protected cultivation is huge for Indian and global markets [11].

1.1. Scope in Vidarbha

Maharashtra stands sixth in respect of area under cultivation in the country with approximately 7000ha. Under cultivation. The major flower crops grown are roses, chrysanthemum, aster, tuberose, jasmine, gillardia, marigold etc. These flowers are mainly grown in Pune, Nashik, Ahmednagar and Sangli districts of Maharashtra these districts are outside of the Vidarbha region of Maharashtra. Recently many private companies and progressive farmers in the state have started export oriented cultivation of flower crops. The crops grown are

Roses, Carnations, Gerbera, Lillie, Gladiolus etc. These companies have contributed much more in floriculture development through green house and tissue culture technology. There are 14 big corporate green houses and 902 small green houses erected on farmers field. [8] Under the Government of India's scheme "Commercial Floriculture", Horticulture Department of Maharashtra State has established a model floriculture centre at Rajgurunagar, district Pune. The state government has taken lead to establish auction market on the lines of Dutch auction centre (Al Sameer) at Goregaon, Mumbai [2].

Maharashtra state have four region Western Maharashtra, Konkan, Marathwada and Vidarbha. The Vidarbha region in Maharashtra is mainly rain fed with the average rainfall of 75cms while the state's average rainfall is 100cms. So, the less water intensive crops are preferred by farmers as 70to80% of farmers depend upon rain for cultivation and irrigation facilities are less. Maharashtra state is having highest number of green house according to data mostly in Pune and Ahmednagar district. But in Vidarbha region green houses are less in number, so the present study is deal with the motivation of farm community towards Hi-tech cultivation of floriculture to improve economic status as well as living standards of farm community in Vidarbha. The Nagpur district of the region is having highest no of green houses followed by Amravati, Wardha, Akola, Buldhana, Chandrapur and Yavatmal respectively. [9] The major commercial flower in the study area are i.e. Gerbera, Gladiolus and Rose under Hi-tech cultivation. In Vidarbha region climate is too hot and due to unavailability of basic infrastructure i.e. continue electricity and irrigation facilities etc. The Carnation crop is not preferred by the flower cultivators in the study area. [3] The need of the present study is to motivate the farmers in Vidarbha towards Hi-tech cultivation and towards floriculture because 70% of the farmers in Vidarbha are marginal farmers (Farmers below land holdings having 1 hectare). And due to small land holdings floriculture in Hi-tech cultivation fits well in to strategy.

2. Materials and Methods

Selection of areas/units of floriculture:

Since the presence study is confined to selected floriculture plants growing in green house, the study is the case study of three greenhouses under floriculture as there are not ample of green houses in the study area, each green house from different districts are selected for the present study.

Selection of green houses under floriculture growing

1. The green house at village Kotha, Tahsil – Kalamb, district Yavatmal named as A.
2. The green house at village Khadva, Tahsil-Wadi, district- Nagpur named as B.
3. Green house installed at tahsil Selu, district Wardha of Shri. Raut named as C.

Floriculture plants selected in green house:

1. Gladiolus
2. Gerbera
3. Rose

Concepts Considered:-

The concepts in the presence study considered for analytical part are as under:-

- i. Cost of Installation of each of the Greenhouses selected.
- ii. Cultivation of selected flowers grown in each of the green houses selected.
- ii. Marketing of selected flower produce in each of the green houses selected with different methods of sale, adopted
- iv. Marketing of selected flowers produced under greenhouse with different methods of sale adopted.

Analytical Approach :-

The analytical approach in the presence study has been extended primarily to the evaluation of,

Fixed Investment:

- A) Cost of installation of green house of specific dimension and its comparison with the cost of installation of the green house of very specific dimension expected to be incurred as per specific norms laid down.
- B) Depreciation: The machineries installed in green house under this study are reported that they are firstly subjected to warranty & guarantee for the period of 2-3 years and secondly, they are covered under insurance. Therefore, compensations are not to be born in terms of depreciation in case of open cultivation, very minimum use of implements is reported to have been made. Therefore depreciation in this cost is negligible and hence not accounted for.

Cost of Cultivation of Floriculture:-

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

- a) Cost A = All the variable costs.
The variable items included under cost A are considered as under:
 - i. Hired human labour..
 - ii. Seeds/ Floriculture planting material.
 - iii. Manures
 - iv. Fertilizers
 - v. Plant protection measures.
 - vi. Irrigation
 - vii. Land revenue
 - viii. Miscellaneous.
 - ix. 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 labour.

2.1. Assessment of Variable Cost Items

The monetary assessment of variable items under consideration, viz –hired human labor, seeds/floriculture planting materials, manures, fertilizers, plant protection measures, irrigation and miscellaneous items have been accounted for at the rate of actual cost incurred while purchasing or making them available for cultivation.

The land revenue charges are accounted as per payment made on the very head to the government for the specific area under consideration. Working capital includes all variable items of the cost. The rate of interest on these working capital items has been charged at 12 percent/annum for the growing period of the specific

flowering plants grown. The fixed capital items related to the presence study in respect of in green house growing of floriculture are land occupied by the green house of specific dimension, cost of installation of green house over it, and machineries installed in it, whereas under open condition of floriculture growing, the fixed investments items are area land under consideration, farm implements, machineries and live stock used for the purpose of said floriculture growing. The rental value of land used for selected floriculture growing under each of growing of floriculture plants in green house has been assessed at the rate of 1/6th value of gross produce of each of the selected floriculture growing.

2.2. Evaluation of Produce

Value of gross produce of each type of the floriculture plants selected and the main produced obtained out of it has to be estimated. This estimation has been effected in case of each of the floriculture growing, as per availability of gross and main produce from it at the time of harvest, at the rate of disposal or sale of such produce.

Measures of comparison :-

i. Cost of cultivation per unit area:-

For the purpose of comparison of growing of selected floriculture plants in green house the cost of cultivation per unit area has been worked out.

ii. Input-Output Ratio:-

For judging the comparative profitability of selected floriculture plants grown in green house the input output ratio has been assessed in the context of

Input output ratio = Gross income (Rs/in each green house)/cost A in context of Cost A

Input output ratio = Gross income (Rs/in each green house)/cost B in context of Cost B.

Input output ratio = Gross income (Rs/in each green house)/ cost C in context of cost C

Marketing of Flowers

The study of marketing channels and price spread in respect of flowers produced from selected floriculture plants grown in green house has been critically studied with reference to the approach of sale of said flowers through domestic markets and at foreign market as the case may be. For this purpose, the marketing cost involved under each channel of price spread and producer's share in consumer's rupee have been worked out to judge the profitability in the specific floriculture growing. The two marketing channels studied under the study they are:

1. On spot sale of flowers: Producer- Commission agent cum wholesaler.
2. In open market sale: Producer – Hundekaries - Commission agent cum wholesaler - retailer - Consumer for marketing of flowers.

3. Results and Discussion

The fixed investment for green house is calculated in tabular form as under:

Cost of installation of each green house invariably matches with the expected fixed cost recommended norms.

Identical of Green House	Area Sq.m	Land	Construction	Machinaries	Irrigation System	ImplementS	Other items	Total Fixed Cost
A	2000	2,50,000	16,36,000	1,00,000	3,40,000	50,000	10,000	22,80,000
		125.00	818.00	50.00	117.00	25.00	5.00	1140.00
		10.96%	71.75%	4.38%	10.26%	2.19%	0.43%	100%
B	1600	1,92,000	12,84,800	1,00,000	1,84,000	50,000	48,000	18,58,800
		120.00	803.00	62.50	115.00	31.25	30.00	1161.75
		10.32%	69.11%	5.37%	9.89%	2.68%	2.58%	100%
C	2080	2,45,440	16,59,840	1,04,000	2,43,360	50,000	10,000	23,12,640
		118	798	50	117	24.03	4.8	1111.83
		10.61%	71.77%	4.49%	10.52%	2.16%	0.43%	100%

The flower wise total produce, total receipt and Receipt/sq.m. for flowers grown in selected green house describe in tabular method as follows:

Table for Total Produce, Total Receipt and Receipt/Sq.m for Flowers Grown in Green House.

Sr.No.	Flowers Grown	Total area of all units under flow in (Sq.m)	Plant Population with distance in Sq.cm	Yield obtained in Names	Rate of sale flower/No or/Kgs	Total Receipts in (Rs)	Receipt From Per Sq.m area (Rs)
1	Gladiolus	480	160000 15X20 cm	32000 Spike	6	192000	400
2	Gerbera	4200	46666 30x30cm	2100000 cuts	3	63,00,000	1500
3	Rose	1000	7407 30X45 cm	296280 cuts	2	2,92,560	592.56

As seen above the flowers of gladiolus under green houses during study year are grown in 480 Sq.m area. The planting distance for gladiolus was 15X20 cm there total in this area of gladiolus plant population was 16000. The receipt from 32000 cuts of gladiolus amounts to Rs. 192000. And therefore per Sq.m revenue proceeds amounts to Rs. 400.

The flowers of Gerbera occupied on area of 4200 Sq.m in all concerned green houses studies together. The

plantation of gerbera was made at a distance of 30x30 cm and therefore, total plant population under gerbera was 46666. It is reported that from the entire growing season, it yielded 2100,000 cuts. These cuts are reported to have been sold at the rate of Rs.3 each and therefore total revenue receipts amount to Rs 63,00,000. The sale of gerbera is reported to have been effected at the spot as per contract. It is seen that the revenue proceeds per Sq.m growing of gerbera amounts to Rs. 1500/sq.m.

The roses are grown in an area of 1000 Sq.m in concerned green house. The planting of roses was made at a distance of 30x45 cm and therefore its total population was 7407. As per the report received, the yield from roses during the season was of 296280 cuts. Like other cut flower roses are sold at the rate of Rs. 2/cut at the spot. The revenue proceeds as seen from table from roses is of Rs. 592560 from entire area under it in green house and therefore, rate of revenue proceeds from Roses in Green house from an area of 1/Sq.m amounts, to Rs.592.56.

In respect of gladiolus grown in 1 Sq.m area amounts to Rs.400. Since for growing gladiolus in green house, the Cost A, Cost Band Cost C, per Sq.m respectively figures to Rs. 194.82, Rs.271.20 and Rs.371.20, the net return from gladiolus over amount to Rs.205.18 over Cost A, Rs.128.8 over Cost B and Rs. 28.8over Cost C when it is grown in green house.

The critical observation reveal that net return from gladiolus grown in 1 Sq.m area is of 205% over Cost A whereas it is nearly 147% of Cost B and 107% of Cost C.

In case of gerbera it is seen that, the revenue receipts from growing in Sq.m amounts to Rs. 1500. Since cost A, cost B and cost C incurred/sq.m. for growing of gerbera in green house amounts to Rs. 564.45; Rs. 842.67 and Rs. 942.67 respectively net return from gerbera grown in 1 Sq.m area in green house amount to Rs. 935.55 over Cost A, Rs.657.33 over Cost B and Rs.557.33 over Cost C respectively. Critical observations reveal that net return over Cost A, Cost B and Cost C is very much high in respect of gerbera. It is measure in terms of times, for comparison style. In this respect, it is seen that net return from growing of Gerbera grown within 1 Sq.m area has yielded 2.66 times more revenue receipts over Cost A;

1.78 times over Cost B and 1.59 times over Cost C/Sq.m growing of Gerbera when it is grown in green house.

In case of roses, which are grown in green house, it is seen that revenue proceeds from them in 1 Sq.m area amount to Rs.592.56. Since the Cost A, Cost B and Cost C for growing of roses in green house is incurred at the rate of Rs.304.75, Rs.418.74 and Rs.518.74/Sq.m respectively the net return from roses amounts to Rs.287.81 over Cost A; Rs.173.82 over Cost B and Rs.73.82 over Cost C. The critical green house is respectively 2.05 times more over Cost A, 1.48 times over Cost B and 1.14 times more over Cost C respectively.

It is to be taken in to account that green house involves huge expenditure on its installation in initial year. Therefore, the recovery of the investment made on fixed items takes period of some years. It is therefore, becomes obvious to judge the profit margin in terms of net return from each of the flowers grown in green house over Cost A, because Cost A includes all recurrent expenses involved on variable Cost components. In the present study, therefore estimation of net returns over Cost B and Cost C in respect of flowers grown in the green house may be treated for academic consideration for the same are not that worth. What matters the most is therefore the net return over Cost A, from each of the flowers grown in green houses with due references to this consideration, it is seen in the present study that all the selected flowers viz; Gladiolus, Gerbera and Roses grown in green house have yielded considerable net return over Cost A. The comparative analysis of net return obtained from each of the flowers under consideration shows that the highest net return from 1 Sq.m area over Cost A is from Gerbera which is respectively followed by Roses and Gladiolus.

Input Output Ratio for Selected Flowers Grown in Green House

Sr.No.	Name of Flower	Output in Rs/Sq.m	Per Sq.meter			Input Output Ration Over		
			Cost A	Cost B	Cost C	Cost A	Cost B	Cost C
1	Gladiolus	400	194.8	271.2	371.2	1:02:05	1:1.47	1:1.07
2	Gerbera	1500	564.5	842.67	942.67	1:2.65	1:1.78	1:1.59
3	Rose	592.56	304.75	418.74	518.74	1:1.94	1:1.41	1:1.14

To show the comparison how green house cultivation is better vis-à-vis open cultivation of flowers following table

is given by collecting the data from open cultivation of floriculture from same field.

Input Output Ratio for Selected Flowers Grown Under Open Cultivation

Sr.No.	Name of Flowers	Output in Rs/Sq.m	Per Sq.meter			Input Output Ratio		
			Cost ARs.	Cost BRs.	Cost CRs.	Cost ARs.	Cost BRs.	Cost CRs.
1	Rose	148.14	51.97	79.23	81.15	1:2.85	1:1.86	1:1.82
2	Tuberose	79.99	18.89	33.16	35.16	1:4.23	1:2.41	1:2.27
3	Aster	56.00	10.68	20.55	25.55	1:5.24	1:2.72	1:2.19
4	Gaillardia	36.00	11.68	18.27	20.77	1:3.08	1:1.97	1:1.73
5	Chrysanthemum	75.00	11.04	24.09	26.59	1:6.79	1:3.11	1:2.82

The net return per square meter of flowers grown under green house are Rs.400/sq.m for Gladiolus, Rs.1500/sq.m. for Gerbera and Rs.592.56/sq.m for Rose. While the net return per square meter for flowers grown under open cultivation are Rs.148.14/sq.m. for rose, Rs.79.99/sq.m. for tuberose, Rs.56/sq.m. for aster, Rs.36/sq.m. for Gillardia, Rs.75/sq.m. for chrysanthemum. The study is based profitability of Hi-tech cultivation so it is necessary to compare it with open production of floriculture. The study concluded that while comprising net return per

square meter the net return is highest in Gerbera in green house cultivation while it is highest in Rose in open cultivation, the study concluded that gerbera gives 10 times more return than that of Rose in open cultivation, Gladiolus gives 3 times more return per square meter than that of Rose in open cultivation while Rose cultivated in green house gives 4 times more return than that of open cultivation of roses. Thus the conclusion come out of the study is that Hi-tech cultivation of flowers is 3to10 times more than that of open cultivation of flowers.

4. Comparisons of Net Returns/sq.m. of Floriculture Under Green House and under Open Cultivation of Green House

The net return per square meter of flowers grown under green house are Rs.400/sq.m for Gladiolus, Rs.1500/sq.m. for Gerbera and Rs.592.56/sq.m for Rose. While the net return per square meter for flowers grown under open cultivation are Rs.148.14/sq.m. for rose, Rs.79.99/sq.m. for tuberose, Rs.56/sq.m. for aster, Rs.36/sq.m. for Gillardia, Rs.75/sq.m. for chrysanthemum. The study is based on comparison of Hi-tech and open cultivation production of floriculture the study concluded that while comprising net return per square meter the net return is highest in Gerbera in green house cultivation while it is highest in Rose in open cultivation, the study concluded that gerbera gives 10 times more return than that of Rose in open cultivation, Gladiolus gives 3 times more return per square meter than that of Rose in open cultivation while Rose cultivated in green house gives 4 times more return than that of open cultivation of roses. Thus the conclusion come out of the study is that Hi-tech cultivation of flowers is 3to10 times more than that of open cultivation of flowers. And subsidies provided by government is higher in green house as compared to open cultivation of floriculture. Thus, by adapting Hi-tech cultivation of floriculture cultivators get highest returns.

5. Conclusion & Recommendations

The study reveals that Hi-tech cultivation of floriculture while comprising net return per square meter the net return is highest in Gerbera. Thus the conclusion come out of the study is that Hi-tech cultivation of flowers is 3to10 times more than that of open cultivation of flowers. And subsidies provided by government is higher in green house as compared to open cultivation of floriculture according to NHM data [10]. Thus, by adapting Hi-tech cultivation of floriculture cultivators grab highest returns.

Recommendations regarding Hi-tech cultivation in the present study are, less but skilled labor should be used during plant protection and post harvest measures. Seeds and planting material should be used by authorized breeders only. Links between R&D lab and Industries should be maintained by growers & Exporters. Modified agronomic practices also acquired by producers and under changing water availability, growers need to consider both short term and long term cropping in rain fed region like Vidarbha. For strengthening domestic market, flower shows should be organised regularly. Establishment of model floriculture centre like Rajgurunagar, Pune should be establish in Vidarbha region. Transportation measures should be made available at cheaper rates. Flower markets should be available which should be organized and regulated. Farmers growing flowers should be provided with necessary credit facilities at cheaper rates in order to meet expenses during the process of cultivation and propagation of flowers. Government should come forward and step up well organized markets and well equipped cold storage for storage of flowers to acquire time and place utilitieLow level of awareness was the greatest hurdle in the downward dissemination of technical know-how and application of improved techniques in production

process. Thus, emphasis should be laid on to improve the awareness level of the farmers through concerted extension education efforts including demonstration trials. The results of the study clearly showed that the maximum income in the study area can be generated through Hi-tech flower cultivation. Hence, flower cultivation in Hi-tech should be encouraged to increase the income of the farmers. There was lack of flower market in the study area. Thus, establishment of regulated market in nearby areas will go a long way in enhancing the income of the farmers. The lack of timely availability of fertilizers, pesticides and improved planting material held back farmers to earn more profit. Thus, regular input supply mechanism needs attention of policy makers. The higher marketing efficiency and better returns to producers through direct retailing is a clear indicator for developing farmer's markets in the region. This will also increase competition in flower marketing for the benefit of both producers and consumers. The farmers should be encouraged to form their own marketing cooperative societies in order to reap the benefit of scale economies (low cost of handling, transportation, packaging and storage) and better bargaining and collective strength. There is need to explore new market outlets within and outside the state as well as export to other countries. More funds should be earmarked for improving infrastructures and modern facilities and amenities. The village level collection/procurement centres should be established in potential areas. Research support for identification of native and novelty flowers and cut foliage plants from indigenous flora for commercialization, post harvest technology, variety improvement, standardization of modern techniques for exotic and domestic flowers under open and green house needs priority attention. The suggestion regarding increase in production of floriculture followed by the application of organic farming in open as well as in Hi-tech cultivation should be applied by the cultivators to avoid soil contamination and maintain the environmental balance.

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