PERFORMANCE ANALYSIS OF HI-TECH FLORICULTURE UNITS IN NORTH KARNATAKA

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MBAL 3020

DEPARTMENT OF AGRICULTURAL MARKETING,
CO-OPERATION AND BUSINESS MANAGEMENT
UNIVERSITY OF AGRICULTURAL SCIENCES
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Project Report submitted to the

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In partial fulfilment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

(Agribusiness Management)

BANGALORE **August, 2017**

DEDICATED TO

DR. HUNSHAL,

BELOVED PARENTS, FAMILY AND SHIVAPRASAD

DEPARTMENT OF AGRICULTURAL MARKETING, CO-OPERATION AND BUSINESS MANAGEMENT
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CERTIFICATE

This is to certify that the Project Report entitled **"Performance Analysis of Hi-Tech floriculture units in North Karnataka** "submitted by **Ms. Snehal Kadadevarmath., ID No. MBAL 3020** in partial fulfilment of the requirement for the degree of **Master of Business Management** in **Agribusiness Management** to the University of Agricultural Sciences, Bengaluru, is a record of bona-fide research work done by her during the period of her study in this University under my guidance and supervision and the project work has not previously formed the basis of the award of any degree, diploma, associate ship, fellowship or other similar titles.

BENGALURU
AUGUST 2017

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Omission of any names in this acknowledgement does not mean lack of gratitude.

Place: Bangalore

Date:

(Snehal Kadadevarmath)

Performance analysis of Hi-Tech floriculture units in North Karnataka

Snehal Kadadevarmath

Abstract

The present study made an effort in the direction of having an integrated study of all aspects of production and marketing of flowers grown in Hi-Tech floriculture units. The study pertains to the year 2014-15. All the farmers from the study area i.e. totally 31 sample farmers were interviewed. For the study, Belagavi and Dharwad Hubli district were selected. From Belagavi 22 gerbera units and from Dharwad Hubli, 8 gerbera units and one rose unit were selected. Totally, 31 Hi-Tech floriculture units were selected. The analytical tools used for the study were Budgeting technique, and Garrett Ranking Technique. The study revealed that, the total cost of cultivation of 1ha of rose and gerbera was Rs 57.66 lakhs and Rs 3.23 lakhs, respectively. Total returns and net returns were found to be Rs 299.61 lakhs and Rs 181.26 lakhs in rose cultivation. In the cultivation of gerbera. Total returns and net returns were found to be Rs 132.33 lakhs, and Rs 59.17 lakhs, respectively. The cost of Hi-Tech floriculture structures accounted for nearly 50-60 per cent of the total establishment cost, in case of Hi-Tech floriculture cultivation i.e. 60 to 70 lakhs. Hence, the Government needs to encourage in developing Hi-Tech floriculture structures using indigenous technologies. Results of financial analysis indicated that Hi-Tech floriculture has good commercial potential. Government needs to plan for providing scientific storage facilities for Hi-Tech floriculture farmers.

August 2017 (B.M. Ramachandra Reddy)

Bengaluru Major Advisor

ಉತ್ತರ ಕರ್ನಾಟಕದಲ್ಲಿ ಪುಷ್ಪದ ಉನ್ನತ ತಂತ್ರಜ್ಞಾನದ ಕ್ರಿಯಾ ವಿಶ್ಲೇಷಣೆ

ಸ್ನೇಹಲ್ ಕಾಡದೇವರಮಠ

ಸಾರಾಂಶ

ಸಂರಕ್ಷಿತ ವ್ಯವಸಾಯ ಪದ್ಧತಿಯಲ್ಲಿ ಆಯ್ದರೈತರುಬೆಳೆದ ಪ್ರಮುಖ ಬೆಳೆಗಳ, ಉತ್ಪನ್ನ ಹಾಗೂ ಮಾರುಕಟ್ಟೆಯ ಸಮಗ್ರ ಅಧ್ಯಯನವನ್ನು 2014–15 ನೇ ವರ್ಷಕ್ಕೆ ಕೈಗೊಂಡಿದೆ.ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಬೆಳೆಗಳ ಕೃಷಿಯಲ್ಲಿ ಹಾಗೂ ಮಾರುಕಟ್ಟೆಯಲ್ಲಿ ಕಂಡು ಬರುವ ಸಮಸ್ಯೆಯನ್ನು ಪರಿಶೋಧಿಸಿ ಅದಕ್ಕೆ ಸೂಕ್ತವಾದ ಸುಧಾರಣೆಗಳನ್ನು ಅವುಗಳ ಸಾಮರ್ಥ್ಯ ಹಾಗೂ ಸಾಧ್ಯತೆಗಳ ಅನುಗುಣವಾಗಿ ಪರಿಹಾರ ಕಂಡುಹಿಡಿಯುವ ಪ್ರಯತ್ನವಾಗಿದೆ.ಈ ಅಧ್ಯಯನಕ್ಕೆ ಉತ್ತರ ಕರ್ನಾಟಕದ ಬೆಳಗಾವಿ ಹಾಗೂ ಧಾರವಾಡ–ಹುಬ್ಬಳ್ಳಿ ಜಿಲ್ಲೆಗಳ ಒಟ್ಟು 31 ಮಾದರಿ ರೈತರು ಬೆಳೆದ ಉನ್ನತತಾಂತ್ರಿಕ ಪುಷ್ಪ ಕೃಷಿ ಯುನಿಟ್‌ಗಳನ್ನು ಆಯ್ದುಕೊಳ್ಳಲಾಗಿದೆ.ಬೆಳಗಾವಿ ಜಿಲ್ಲೆಯ 22 ಝರಬರಾ, ಹುಬ್ಬಳ್ಳಿ ಧಾರವಾಡ ಜಿಲ್ಲೆಯ 8 ಝರಬರಾ ಮತ್ತು ಒಂದು ಗುಲಾಬಿ ಯುನಿಟ್‌ಗಳನ್ನು ಆಯ್ದುಕೊಳ್ಳಲಾಗಿದೆ.ಈ ಅಧ್ಯಯನಕ್ಕೆ ಉಪಯೋಗಿಸಲಾದ ವಿಶ್ಲೇಷಾತ್ಮಕ ಸಾಧನಗಳೆಂದರೆ ಆದಾಯ ವೆಚ್ಚಗಳ ಪರಿಭಾಷೆ ಮತ್ತು ಆರ್ಥಿಕ ಸಾಧ್ಯತೆಗಳ ವಿಶ್ಲೇಷಣೆ ಮತ್ತು ಗ್ಯಾರೆಟ್ ರ್ಯಾಕಿಂಗ್‌ಟೆಕನಿಕ್ (ತಂತ್ರಾಂಶ) ಇರುತ್ತದೆ.ಈ ಅಧ್ಯಯನದಿಂದ ಒಂದು ಎಕರೆ ಪ್ರದೇಶದಲ್ಲಿ ವ್ಯವಸಾಯ ಮಾಡಿದ ಗುಲಾಬಿ ಹಾಗೂ ಝರಬರಾಗಳ ಒಟ್ಟು ಬೆಲೆ ಅನುಕ್ರಮವಾಗಿ 57.66 ಲಕ್ಷ ರೂಪಾಯಿಗಳು ಹಾಗೂ 32.37 ಲಕ್ಷ ರೂಪಾಯಿಯಾಗಿರುತ್ತದೆ. ಗುಲಾಬಿ ಕೃಷಿಯಲ್ಲಿ ಒಟ್ಟು ಆದಾಯ ಮತ್ತು ನಿವ್ವಳ ಆದಾಯ ಅನುಕ್ರಮವಾಗಿ 299.61 ಲಕ್ಷ ಮತ್ತು 181.26 ಲಕ್ಷ ರೂಪಾಯಿಗಳು ಕಂಡುಬಂದಿದೆ. ಝರಭರಾ ಕೃಷಿಯಲ್ಲಿ ಒಟ್ಟುಆದಾಯ ಮತ್ತು ನಿವ್ವಳ ಆದಾಯ ಅನುಕ್ರಮವಾಗಿ 132.33 ಲಕ್ಷ ರೂಪಾಯಿ ಮತ್ತು 59.17 ಲಕ್ಷ ರೂಪಾಯಿ ಇರುವುದು ಕಂಡುಬಂದಿದೆ. ಉನ್ನತ ತಂತ್ರಜ್ಞಾನದ ಪುಷ್ಪ ಕೃಷಿ ರಚನೆಯಲ್ಲಿ ಸುಮಾರು ಶೇಕಡಾ 50–60 ಒಟ್ಟು ನಿರ್ಮಾಣ ಖರ್ಚುಕಂಡುಬಂದಿದೆ. ಅಂದರೆ 60 ರಿಂದ 70 ಲಕ್ಷ ಪ್ರತಿವಾದಿ ರೈತರಿಗೆ ಹೊರೆಯಾಗ ಬಹುದು. ಆದ್ದರಿಂದ ಸರಕಾರವು ಅತ್ಯಂತ ಕಡಿಮೆ ಪರಿಕರಗಳ ದೇಶಿಯ/ಸ್ವದೇಶಿಯ ತಂತ್ರಜ್ಞಾನವನ್ನು ಉಪಯೋಗಿಸಿ ಪುಷ್ಪ ಕೃಷಿಯ ಅವಶ್ಯಕತೆಯನ್ನು ಅಭಿವೃದ್ಧಿಪಡಿಸಲು ಪ್ರೋತ್ಸಾಹಿಸಬೇಕು ಆರ್ಥಿಕ ವಿಶ್ಲೇಷಣೆಯ ಪರಿಣಾಮವನ್ನು ನೋಡಿದಾಗ ಉನ್ನತ ತಂತ್ರಜ್ಞಾನದ ಪುಷ್ಪ ಕೃಷಿ ಬೆಳೆಗಳ ಪ್ರದೇಶವನ್ನು ವಿಸ್ತರಿಸುವಂತೆ ಪ್ರೋತ್ಸಾಹಿಸಬೇಕು. ಆದಕಾರಣ ಸರಕಾರವು ಹೊಸ ಹೊಸ ಪ್ರಕ್ರಿಯೆಗಳ ಯುನಿಟ್‌ಗಳನ್ನು, ವೈಜ್ಞಾನಿಕ ಸಂಸ್ಕರಣಾ ಮತ್ತು ಉನ್ನತ ತಂತ್ರಜ್ಞಾನದ ಪುಷ್ಪ ಕೃಷಿ ಬೆಳಗಳ ರೈತರಿಗೆ ಭರವಸೆಯ ಸ್ಪಂದನೆಯನ್ನು ಪೂರೈಸುವ ಯೋಜನೆಯನ್ನು ಸ್ಥಾಪಿಸಬೇಕು.

ಅಗಸ್ಟ್ 2017
ಬೆಂಗಳೂರು

(ಬಿ.ಎಮ್.ರಾಮಚಂದ್ರ.ರೆಡ್ಡಿ)
ಮುಖ್ಯ ಮಾರ್ಗದರ್ಶಕರು

Constraints in Hi-Tech Floricultural Farming –A study In North Karnataka.

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Introduction

- Hi-tech floriculture industry in India is performing steadily in the last 15 years, it is one of the foreign exchange earner in agricultural sector, Karnataka's floricultural industry is undergoing several constraints and bottle necks due to which the returns are not steady.
- At present West Bengal reports first in production of cut flowers of about 33% share followed by Karnataka 12% and Maharashtra 10% in the year 2012-13. India exported 22,485.21 MT floricultural products in the year 2012-13, worth of Rs.455.90 crores (APEDA).
- The floricultural in North Karnataka is progressing in the recent past due to conducive climatic conditions and concentrated mostly in the districts of Belagavi and Dharwad.
- The Hi-Tech floricultural farmers are facing lot of problems retailing to marketing of flowers in both domestic and International markets.
- Other problems encountered by farmers are pests and diseases, labour and high cost of maintenance are affecting the profitability of the industry.

Objective

1.To document the constraints encountered by Hi-Tech floriculture units.

Materials

- The present study was conducted in North Karnataka Districts of Belagavi and Dharwad. The data was collected from 30 Hi-Tech floricultural units. The unique feature observed was that, the farmers are mainly growing Gerbera flowers in these districts.

Methods

- To study the constraints faced by the floriculture farmers in the districts of Belagavi and Dharwad, Garrett's ranking technique was applied. This technique gives the change of orders of constraints and advantages into numerical scores.
- Garrett's formula for converting ranks .

Per cent position=100*(Rij-0.5)/Nj
Where Rij= rank given for ith factor by jth individual Nj= number of factors ranked by jth individual

- The per cent position of each rank will be converted into scores by referring to the table given by Garrett and Woodswordh (1969).
- For each factor, the score of individual respondents were added and divided from the total number of respondents.
- The mean scores obtained for all the factors were arranged.
- Based on the rank the important factors responsible for constraints faced by the farmers were identified.

Results

Table 1. Production problems encountered by Hi-Tech floriculture farmers

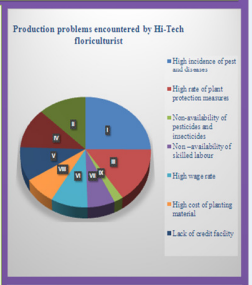
Sl.No.	Particulars	Ranks	Garret score
1	High incidence of pests and diseases	I	69.83
2	High cost of maintenance	II	44.07
3	High rate of plant protection measures	III	34.80
4	Lack of technical guidance	IV	33.23
5	Lack of credit facility	V	27.33
6	High wage rate	VI	24.23
7	High cost of planting material	VII	21.13
8	Non-availability of skilled labour	VIII	18.03
9	Non-availability of pesticides and insecticides	IX	6.03

Table 2. Marketing problems faced by Hi-Tech floricultural farmers

Sl.No.	Particulars	Ranks	Garret score
1	High commission charges	I	76.20
2	Low demand in local market	II	73.57
3	Lack of market information	III	54.43
4	No incentives from the government	IV	47.30
5	High packaging cost	V	46.20
6	Problems in Transportation	VI	42.53
7	Lack of regulated marked facility	VII	38.90
8	Lack of grading and standardization	VIII	34.73
9	Lack of storage facility	IX	30.07

Discussion

- Table 1 & 2 highlights the Garrett total score, which indicates the factors that are problematic to the respondents during the production and marketing of the flowers.
- Table 1 depicts that, high incidence of pests and diseases ranks I (69.83), followed by high cost of maintenance which ranks II (44.07) as Hi-Tech units are prone to tear under harsh climatic conditions will lead to high cost of repair and replacement is also adding to the problems of farmers. Expensive plant protection measures ranks III (34.80) as per the analysis. The Least scoring rank IX (6.03) was non- availability of pesticides and insecticides, which reflects that farmers are happy with the availability of pesticides and insecticides when compare to other constraints.
- Table 2 depicts that, high rate of commission has been ranked I (76.20) since most of the produce is marketed through commission agents, followed by low demand in local market ranking II (73.57), which leads to marketing of the produce at distant places like Bengaluru, Hyderabad and Goa. The Demand for flowers is seasonal and insufficiency of authentic marketing information is ranked III (54.43).The least score ranking IX (30.07) was lack of scientific storage facility.



Summary

From the study it was observed that, the Hi-tech floricultural farmers in districts of Belagavi and Dharwad are encountering the major constraint such has high incidence of pest and diseases, high commission charges, high cost of maintenance and insufficiency of market information etc., The highest ranking was given to these constraints when compared with other problems. Hence there is a scope to address these issues to enhance the income of floriculture farmers.

Advisory committee

Chairman

Dr.B.M.Ramchandra Reddy

Members

1.Dr.C.P.Gracy
2.Mr.T.N.Venkata Reddy
3.Dr.P.S.Srikantha Murthy.

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I INTRODUCTION

Floriculture may be defined as the art, science and business of growing and marketing flowers. As an art, it refers to the cultivation of flowers; as a science it systematically studies botanical aspects of flowers and plants; and as a business it deals with the cost of production and income from flower production and marketing.

Indian Floricultural Industry

Government of India has identified floriculture as a sunrise industry and accorded its 100 percent export oriented status. Owing to steady increase in demand of flower, floriculture has become one of the important commercial trades in Agriculture. Hence, commercial floriculture has emerged as Hi-Tech activity-taking place under controlled climatic conditions inside greenhouse. Floriculture in India is viewed as a high growth Industry. Commercial floriculture is becoming important from the export angle. The liberalization of industrial and trade policies paved the way for development of export-oriented production of cut flowers. 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.

Indian floriculture industry has been shifting from traditional flowers to cut flowers for export purposes. The liberalized economy has given an impetus to the Indian entrepreneurs for establishing export oriented floriculture units under controlled climatic conditions. India is bestowed with several agro-climatic zones conducive for production of sensitive and delicate floriculture products. During the decade, after liberalization, floriculture industry took giant steps in the export arena. This era has seen a dynamic shift from sustainable production to commercial production. As per National Horticulture Database published by National Horticulture Board, during 2012-13 the area under floriculture production in India was 232.74 thousand hectares with a production of 1.729 million tonnes loose flowers and 76.73 million tonnes cut flowers. Floriculture is now commercially cultivated in several states with West Bengal (32per cent), Karnataka (12per cent) and Maharashtra (10per cent), having gone ahead of other producing states

like Madhya Pradesh, Gujarat, Punjab, Haryana, Andhra Pradesh, Orissa, Jharkhand, Uttar Pradesh and Chhattisgarh. The floriculture industry comprises of flowers such as Rose, Tube Rose, Glads, Anthurium, Carnations and Marigold etc. Cultivation is undertaken in open-farm conditions as well as state-of-the-art poly and greenhouses.

India's total export of flowers was Rs. 460.75 crores in 2014-15. The major importing countries were United States, Netherlands, Germany, United Kingdom, United Arab Emirates, Japan and Canada. There are more than 300 export-oriented units in India. More than 50per cent of the floriculture units are based in Karnataka, Andhra Pradesh and Tamil Nadu. With the technical collaborations from foreign companies, the Indian floriculture industry is poised to increase its share in world trade.

According to the statistics indicated in the Handbook on Horticulture Statistics 2014, the total area under flower crops in 2012-13 was 232.70 thousand hectares. Total area under floriculture in India is second largest in the world next to China. Production of flowers was estimated to be 1729.2 MT of loose flowers and 76731.9 million (numbers) of cut flowers in 2012-13. Fresh and Dried cut flowers dominate floriculture exports from India. Among the states, Karnataka is the leader in floriculture with about 29,700 hectares under floriculture. Other major flower growing states are Tamil Nadu and Andhra Pradesh in the South, West Bengal in the East, Maharashtra in the West and Rajasthan, Delhi and Haryana in the North.

In India, marketing of cut flowers is much unorganized. In most of the Indian cities flowers are brought to wholesale markets, which mostly operate in open yards. From here the flowers are distributed to the local retail outlets which more often than not operate in the open on-road sides, with different flowers arranged in large buckets. In the metropolitan cities, however, there are some good florist show rooms, where flowers are kept under controlled temperature conditions, with considerable attention to value added service. The government is now investing in setting up of auction platforms, as well as organized florist shops with better storage facilities to prolong shelf life. The packaging and transportation of flowers from the farms to the retail markets at present is very unscientific. The flowers, depending on the kind, are packed in gunny bags, bamboo

baskets, simple cartons or just wrapped in old newspapers and transported to markets by road, rail or by air. However, the government has provided some assistance for buying refrigerated cargos and built up a large number of export oriented units with excellent facilities of pre-cooling chambers, cold stores and reefer vans.

According to a study titled, 'Indian Floriculture Industry: The Way Ahead' released by the apex industry body ASSOCHAM, India's floriculture industry is growing at a compounded annual growth rate of about 30per cent, and is likely to cross Rs 8,000 crore mark by 2015. Currently, the floriculture industry in India is poised at about Rs 3,700 crore with a share of a meager 0.61per cent in the global floriculture industry which is likely to reach 0.89per cent by 2015.

Karnataka is a leading state in area and production of flowers in the country. The area under flower crops is 30,000 ha and the production is 2,83,000 million tonnes of flowers during 2013-14. A large number of flowers like jasmine, tubeRose, Rose, chrysanthemum, marigold, crossandra, barleria, lilly, limonium, alsteoemeria, liatris, freesia, iris, lilianthus, calla, carnation, Gerbera and anthurium are commercially cultivated in the state. Many Hi-tech units with export tie-ups are there in the state. There are several commercial tissue culture laboratories. The daily average trade of cut flowers is over Rs. 2 lakh and loose flowers over Rs. 5 lakhs in Bangalore itself. As far as the productivity is concerned, there is lot of scope for increasing the productivity and profit through adoption of the latest improved production and marketing technologies. There is a need to generate information regarding production and marketing aspects, the profile of cut flower growers and the constraints in production and marketing of cut flowers. Belagavi is one of the major flower producing districts of Karnataka. It ranks second in floriculture and the demand for flowers from Belagavi is good because of its flower quality.

Green House Technology for Flower Production

In present scenario of increasing demand for cut flowers protected cultivation in green houses is the best alternative for using land and other resources more efficiently. In protected cultivation, suitable environmental conditions for optimum plant growth are

provided which ultimately provide good quality products. Green House is made up of glass or plastic film, which allows the solar radiations to pass through. But, traps the thermal radiations emitted by plants inside and thereby provide favourable climatic conditions for plant growth. On the basis of basic material used, building cost and technology used, green houses can be of three types-

Low-cost greenhouse: The low-cost green house is made of polythene sheet of 700 gauge supported on bamboos with twines and nails. Its size depends on the purpose of its utilization and availability of space. The temperature within greenhouse increases by 6-100C more than outside.

Medium-cost greenhouse: With a slightly higher cost greenhouse can be framed with GI pipe of 15 mm bore. This greenhouse has a covering of UV -stabilized polythene of 800 gauge. The exhaust fans are used for ventilation which are thermostatically controlled. Cooling pad is used for humidifying the air entering the chamber. The greenhouse frame and glazing material have a life span of about 20 years and 2 years respectively.

Hi-tech greenhouse: In this type of greenhouse the temperature, humidity and light are automatically controlled according to specific plant needs. These are indicated through sensor or signal-receiver. Sensor measures the variables, compare the measurement to a standard value and finally recommend running the corresponding device. Temperature control system consists of temperature sensor heating/cooling mechanism and thermostat operated fan. Similarly, relative humidity is sensed through optical tagging devices. Boiler operation, irrigation and misting systems are operated under pressure sensing system. This modern structure is highly expensive, requiring qualified operators, maintenance, care and precautions. However, these provide best conditions for export quality cut flowers and are presently used by large number of export units.

Gerbera

Gerbera is a beautiful dwarf perennial plant. It is used as cut flower, garden flower and it makes a good showing in exhibitions and floral arrangements because of its numerous colours and shapes. Botanically, it is *Gerbera jamesonii* and belongs to the family Asteraceae. This group at present comprises 45 species, native to tropical Asia and

Africa. Though, the crop can be cultivated in moderately warmer areas in the open sunny situations, the performance of the crop is enhanced when grown in protected or semi protected conditions. To get longer stems, brighter colours and high productivity per unit area, it is essential that appropriate production technologies and efficient crop management techniques are practiced. The market requirement for cut flowers is very specific and it can be met consistently, only when the crop is grown under protected conditions.

Flowering will commence from 2.5 to 4.5 months after planting, first peak production will occur in 7 to 8 months after planting. Each Gerbera plant if properly maintained will produce 50 to 65 flowers per year (Nanjan, 1994). An added advantage of Gerbera plant is that it can be grown outdoors, under protected cultivation and also in soil less culture or hydroponics. Generally, plant bloom throughout the year with sparse flower production during rainy season. At present in India, it is cultivated commercially in and around cities like Pune, Ooty and in the parts of Punjab, Kashmir, Sikkim and West Bengal. In Karnataka, it is grown in a few pockets around Bangalore, Dharwad and Belgaum districts.

Gerbera as a cut flower has tremendous demand in domestic and international markets. The flower occupies 6^{th} position in the Alsameer flower auction center in Netherlands. In recent days, commercial production of Gerbera is a major venture in India among the ornamentals. Inspite of having the immense possibility for world class steady production of acclaimed varieties, India is still lagging behind in international market. The production technology for viable production needs to be standardized for Indian climate and soil. More over the commercial floriculture venture is very much cultivar specific.

Floriculture has emerged as an important agribusiness, providing employment opportunities and entrepreneurship in both urban and rural areas. National Horticulture Board helps one to establish a flower business. Agricultural and Processed Food Products Export Development Authority helps entrepreneurs with cold storage facilities and freight subsidies. It has been found that Commercial Floriculture has higher potential per unit area than most of the field crops and therefore a lucrative business. During the last

decade, there has been a thrust on export of cut flowers. The export surplus has found its way into the local market influencing people in cities to purchase and use flowers in their daily lives. Floriculture thus, offers a great opportunity to farmers in terms of income generation and empowerment. Small and marginal farmers may also use every inch of their land for raising the flower and foliage crops. Floriculture also offers careers in production, marketing, export and research. One can find employment in the floriculture industry as a farm manager, plantation expert, supervisor or project coordinator. Besides, one can work as consultant or landscape architect with proper training. In addition, floriculture also provides career opportunities in service sector which include such jobs as floral designers, landscape designers, landscape architects and horticultural therapists. The present study made an effort in the direction of having an integrated study of all aspects of production and marketing of major crops grown in protected cultivation technology and to identify the problems faced in its cultivation and marketing with an overall view of exploring the possibilities and potentialities for bringing about the required improvement with the following specific objectives

Specific objectives

1. To analyse the cost, returns and profitability of Hi-Tech floriculture units in North Karnataka.
2. To document the constraints encountered by Hi-Tech floriculture units.
3. To assess the market potential and value addition of flowers in domestic market.

Hypotheses

1. Investment in Hi-Tech floriculture cultivation is financially feasible.
2. Hi-Tech floriculture is cost effective and profitable.
3. There are few channels in marketing of Hi-Tech floriculture cultivation units.
4. There are some constraints in Hi-Tech floriculture cultivation technology.

Special Feature of the Investigation:

The study will be of immense help in assessing the determinants of adoption of Hi-Tech floriculture, which in turn helps to design and develop appropriate economic strategy to accelerate the rate of adoption. The socio-economic impact of Hi-Tech floriculture adoption on various categories of farmers will help in devising appropriate technology and economic measures for further large-scale adoption. This study also identifies and documents various local farmers' innovations and refinements, ultimately leading to the development of location specific Hi-Tech floriculture. Low productivity, inadequate marketing arrangements with high price spread and presence of multiple marketing intermediaries are the major bottlenecks in production and marketing of these high value crops. Though the state has a good potential for export of these high value crops inadequate processing, storage, handling and transportation are hindering the progress. The constraints and challenges at various levels in the adoption of Hi-Tech floriculture by farmers would help to suggest appropriate changes in the policy options to promote its adoption at a faster rate. The results of the study would also be of immense value to the farmers, scientists, policymakers, researchers and all those associated with Protected Cultivation Technology promotion in particular and agriculture in general.

II REVIEW OF LITERATURE

The concepts used in the earlier studies have been reviewed and the concise information from those that are relevant to the objectives of the present study is presented in this chapter. For enhancing clarity, the review has been grouped under the following headlines:

2.1 Cost concepts, returns and investment analysis

2.2 Financial feasibility

2.3 Marketing cost and price spread

2.4 Constraints in production and marketing

2.1 Cost concepts, returns and investment analysis

Shedage and Borude (1992), in their study on the economic analysis of flower production in Thane district of Maharashtra compared the economic performance of three flowers, namely kagda, mohra and spider lily. They calculated Benefit-Cost Ratio at cost-A, cost-B and cost-C and concluded that mohra performed better than the other two with Benefit-Cost Ratio of 2.94, 1.87 and 1.55 at cost A, B and C respectively.

Subramanyam (1995) calculated the cost of cultivation of Rose in Karnataka. The results showed that, the establishment and maintenance cost for age groups: less than one year, 1-5 years and 5-10 years were Rs. 71,233, Rs. 31,805 and Rs. 36,961 respectively. The average annual cost of cultivation per hectare, gross returns per hectare and net returns per hectare were Rs. 33,233, Rs. 1,01,850 and Rs. 68,617, respectively. He compared the economics of Rose with that of other flower crops like jasmine, chrysanthemum, tubeRose, marigold, crossandra, gladiolus and aster and concluded that Rose required the highest establishment cost of Rs. 71,000 per hectare. He compared the field grown Rose cultivation between four states: Karnataka, Tamil Nadu, Maharashtra (Nasik) and Delhi. The results indicated that growing Roses in Maharashtra was highly profitable than other states with net returns, which was Rs. 1,04,894 per hectare.

Guledgudda (1996) in his study on the production and marketing of flowers in Dharwad district of Karnataka State, classified cost of cultivation into three components: variable costs, fixed costs and marketing costs. He analyzed the investment worthiness using tools such, as Net Present Value, Benefit-Cost Ratio and Internal Rate of Returns. The Net Present Value was worked out to be Rs. 1, 82,742 per cent. The Benefit-Cost Ratio was calculated as 1.73. These results indicated that venturing in jasmine cultivation was profitable.

Bhattacharya (1997) made a detailed study on the floriculture industry in India and found that the profit margin varied between 25 to 30 per cent of the cost of production. Roses were sold at the local market at Rs. 70-100/kg. A basket of Roses was priced at Rs. 150. The average price at Dutch auction in May 1991 was Rs. 12.20 per Rose stem. He opined that, the floriculture industry is both capital and labour intensive with an investment of Rs. 2.50 crores per hectare. It was found that more the land better was the economy of scale. The investment on plant materials alone accounted about 25 per cent of total establishment cost.

Pushpalatha *et al.* (1997), in their study on the economics of Rose production in Bangalore district of Karnataka, classified the establishment costs into two components: (i) labour cost and (ii) material costs which accounted 13.85 per cent and 86.15 per cent of the total establishment cost respectively.

Gajanana and Subramanyam (1998), in their study on production and marketing of anthurium, worked out the cost for establishing 2000 anthurium plants to be Rs. 2, 37,150, thereby, indicating capital-intensive nature of the flower crops. The annual maintenance cost including the marketing cost worked out to be Rs. 25,617.

Nagendra (1998), in his study on the cut-flower production and marketing in Karnataka, grouped various items under cost of production of Rose cut-flowers under open field cultivation into two categories: variable costs and fixed costs. The variable costs formed the major chunk, i.e., 82 per cent and 79 per cent of first and second year respectively. While the fixed costs constituted about 18 per cent and 21 per cent of the total cost of production of the first and second year respectively.

Ramaratnam (1998) estimated the average cost of establishment of one hectare of growing a crop in greenhouse using Israeli technology. The project outlay was worked out to be one crore rupees per hectare. Of this, the cost of greenhouse structure alone constituted about 60 per cent. The implementation period was found to be four to five months.

Sivaramane (1998) made a study on sustainability analysis of commercial floriculture around Bangalore in which hi-tech Rose and field Rose were compared. The results revealed that, under hi-tech Rose cultivation, per hectare cost of establishment of hi-tech Rose was Rs. 12538.00 thousand in which, green house cost and planting material cost were the major item of cost. The cost of cultivation of hi-tech Rose was found to be Rs. 4873.65 thousand per hectare. On an average of 27.70 lakh flowers were cultivated in one hectare of hi-tech Rose cultivation. Of these nearly 66 per cent of the total yield realized export price of Rs. 8.37 per flower and remaining 34 per cent realised domestic price of Rs. 1.46 per flower with net return of Rs. 4890.00 thousand. While, under field Rose cultivation, per hectare cost of establishment of field Rose of was Rs. 53.56 thousand and of which planting material cost was the major item of cost incurred. Whereas, the cost of cultivation of field Rose was found to be Rs. 153.86 thousand per hectare. On an average of 7.25 lakh flowers were cultivated in one hectare of field Rose cultivation per year. Field Rose cultivation earned net return of Rs. 27.56 thousand per hectare with Rs. 0.25 per flower realized.

Joshi (1999) analysed the economics of credit requirement in cultivation of selected flowers around Pune city. Information was collected from 120 samples for the flowers viz., Roses, chrysanthemum, tubeRose and marigold. The per hectare credit requirement worked out to Rs. 62788.99, Rs. 32207.99, Rs. 30975.84 and Rs. 13120.47 for Rose, chrysanthemum, tubeRose and marigold respectively. Studies on cost and returns structure showed that though the chrysanthemum crop required a high expenditure, it was very profitable crop if grown carefully.

Sudha (2000) in the thesis the conclusion was given that, Hi-tech floriculture of cut flowers (Roses) has been promoted as an agribusiness activity in India, with a primary objective of exploiting export markets and earning much needed for foreign exchange.

Naik (2005) reported that, among the three growing conditions namely, medium cost polyhouse, low cost polyhouse and net house. The medium cost polyhouse recorded higher yield. The favorable environmental conditions prevailed in medium cost polyhouse which helped in better growth of roots and shoots which directly helped in better vegetative growth and finally improving the yield attributing parameters *viz.*, number of fruits per plant (10.29), fruit weight per plant (1.02), pericarp thickness at blossom end (1.23 cm), fruit length (8.49cm) and fruit breadth (7.24) and these finally led to highest total yield of 37.77 t per ha.

Jethendra (2007) carried out a comparative analysis of two types of cultivation of Rose that is open and protected condition. In this study, it was observed that in hi-tech cultivation as the overall level, the average size of farm was 3.24 hectare. It was 1.65 hectare in small, 2.52 hectare in medium and 5.56 hectare in large size groups. The overall per hectare use of human labour in hi-tech was 5778.66 man-days. In field Rose, it was 645.00 man-days. Labour utilization for hi-tech in different size groups of farms revealed that about 60.98 per cent of male and 52.34 per cent of female labour were hired and about 39.32 per cent of male and 47.66 per cent of female labour were owned. The cost of establishing hi-tech Rose garden was Rs. 5963.38 thousand, building and green house structures constituted 57.50 per cent of the total establishment cost. He observed that use of planting material and plant protection increased with increase in the size of farm. For hi-tech, per hectare overall cost A, B and C worked out to Rs. 2501.91 thousand, Rs. 4456.55 thousand and Rs. 4579.16 thousand, respectively. Per-hectare yield of Rose flowers in hi-tech was the highest (2764900 number) in large groups of farm, followed by medium (2200864 number) and small (1664122 number) size groups of farm respectively and at the overall level per hectare yield was 2189962 numbers. At the overall level, gross income received was Rs.9611.27 thousand and net profit was Rs. 5032.11 thousand at cost "C" per hectare out-put ratio of the cost C and cost of production at the overall level was 1.20 and 1.36 that was greater than one.

Senger and Kothari (2008) observed that raising of Rose nursery was quite difficult due to low temperature in winter season. Looking to the importance and temperature requirement for nursery raising for proper growth in winter, rose (*Rosa chinensis*) were

selected for experiment under arch shape greenhouse. The total construction cost of 80 m^2 arch shape greenhouse was Rs.100000/-. Out of total 80 m^2 floor area, 55 m^2 area was used for plant seedling and 25 m^2 areas was left for movement in the greenhouse carrying out agricultural operations.

Agasimani *et al*. (2011) conducted a study on performance and economics of Anthurium varieties under Greenhouse. The study showed that there was a significant difference with respect to varieties, one year after planting. Among the ten varieties tried, variety 'Esmeralda' had the highest B: C ratio (3.8) and the variety 'Ivory' had the lowest B: C ratio (0.7). The total cost of cladding material including shade net was Rs.12133. The cost of each plant was Rs.65. The total cost of cultivation of anthurium varieties under greenhouse was Rs.1, 60, 670.7 for 560 m^2 area.

2.2 Financial feasibility of investment

Mallareddy (1989) studied the financial feasibility of investment in sweet orange plantation in Prakasam district, Andhra Pradesh and reported that the per acre net present value for the entire life of the project was found to be Rs. 11,83.43 in case of small orchard, Rs. 27,540.33 in large orchard and Rs. 16,682.94 in average orchard. The benefit cost ratio at 12 per cent discount rate was 1.28 in small orchard, 2.04 in large orchard and 1.47 in average orchard. The payback periods were eight, seven and eight years in small, large and average orchards, respectively and internal rate of returns was 14.70, 21.24 and 16.26 per cent in same order.

Raikar (1990) studied the financial feasibility of investment in cashewnut orchard in Karnataka and reported that per ha. NPV was found to be Rs. 28440.58 in case of small orchard, Rs. 16780.84 in large orchard and Rs. 21034.59 in average orchard. The B:C ratio at 12 per cent discount rate were 2.87, 2.25 and 2.49 for small, large and average orchards. The payback period was 8.90, 9.38 and 9.18 years in small, large and average orchards, respectively. The Internal Rate of Return was found to be 20.22, 17.88 and 18.88 per cent in small, large and average orchard respectively.

Hugar *et al.* (1991) examined the economic potentiality and viability of guava cultivation under scientific management. The study revealed that the net present worth was

Rs. 73,804 per hectare. The benefit cost ratio, internal rate of returns and payback period were found to be 3.88, 57.82 per cent and 6 years, respectively.

Azad and Sikka (1993) applied project evaluation measures to study economic viability of cultivation of fruits like apple, peach and plum. The net present value was Rs.26, 237 for apples, Rs. 89,222 for peaches and Rs. 1, 17,137 for plums. The internal rate of return was 32, 36 and 47 per cent, respectively. The benefit cost ratios were 1.36, 3.87 and 5.10 in that order.

Hiremath (1993) estimated the cost and returns at a discounted rate of 12 per cent and estimated the financial feasibility measures namely NPV, BCR, IRR and back period for cultivation of lime in Bijapur district. At normal cost and returns, NPV was Rs. 1, 16,183, Rs. 1, 34,793 and Rs. 1, 38,263 for small, medium large gardens, respectively. The BCR was 3.06, 3.74 and 3.93 for small, medium and large gardens, respectively. IRR was about 25.82, 27.65, 28.23 per cent and PBP was about 7.00, 6.61 and 6.40 years for small, medium and large gardens, respectively.

Chitra *et al.* (1997) used project evaluation technique to assess the financial feasibility of investment in ber cultivation in and around Hyderabad city of Andhra Pradesh. The study reported that, the payback period in ber cultivation was 4.42 years, Benefit Cost Ratio was 5.25, Net Present Value was Rs. 12,061 and the IRR was 73.54 per cent. The results of the study indicated that even though ber cultivation required relatively higher initial investment compared to other fruit crops, the economic indicators clearly showed that the investment in cultivation of ber was economically viable.

Patil *et al.* (2000) evaluated the feasibility of investment in teak plantation in Nagpur forest circle of Maharashtra state, employing project evaluation techniques. The benefit cost ratio, net present value, profitability index, payback period and internal rate of returns at 12 per cent discount rate were 5.77, Rs. 1,02,275, 9.49, 9 years and 34.88 per cent, respectively. While the corresponding figures at 15 per cent discount rates were 4.19, Rs. 52,003, 6.30, 9 years and 33.24 per cent. This indicated that all the parameters of economic feasibility test turned out to be favourable, thereby justifying investment in teak plantations which was found to be economically viable proposition.

Pawan *et al.* (2002) conducted a study on cost-benefit analysis of ber cultivation in Rohtak district of Haryana by a randomly selecting 30 ber growers. Feasibility of investments in ber cultivation was evaluated by employing four indicators *viz.*, Net Present Value, Internal Rate of Return, Benefit Cost Ratio and Payback Period. The result of the study indicated that ber cultivation was intensive with an IRR of 22.5 per cent. The NPV and BCR at a discount rate of 14 per cent were Rs. 26,346 and 1: 1.22 respectively. The investment in ber orchard was a payback period of 7 years. Liberal credit facilities, adequate and timely supply of inputs particularly good quality planting materials, efficient marketing system *etc.,* were suggested to make ber cultivation a successful venture.

Naik (2005) in comparison of naturally ventilated polyhouse and shadehouse condition with respect to benefit cost ratio, the shadehouse was found better than naturally ventilated polyhouse because the cost of structure was very less than polyhouse. These results corroborate with the findings of Naik (2005). In naturally ventilated polyhouse 2.34 per cent more cost of cultivation per year per 500 m2 was calculated than shadehouse condition. Capsicum has given a good response to shadehouse also. Only in rainy days, there was a problem of rainfall, so if any provision is made to avoid the entry of rain inside shadehouse during rainy days then the shadehouse will be best in the region like Northern Transitional Zone of Karnataka, Dharwad.

Goswami and Challa (2007) conducted a study on economic analysis of smallholder rubber plantations in West Garo Hills district of Meghalaya. The results of the study revealed that per hectare cost of establishment was Rs. 22,548.00 whereas the maintenance cost was Rs. 19,935.38. They reported that discounted net cash flow technique was very appropriate for investments of the depreciating type and the results of the study showed that the NPV, B:C ratio, IRR and Pay Back Period of the plantation were Rs. 55,014.11, 2.14, 14.40 per cent and 9.14 years, respectively.

Senger and Kothari (2008) observed that greenhouse was an effective solution to nursery grower who would be able to recover his investment on greenhouse within a period of 2.2 years. Minimum survival percentage found in Rose nursery in greenhouse was 65per cent. NPW of investment made on greenhouse, the internal rate of return, the benefit cost

ratio, when Rose nursery grown inside the greenhouse were Rs.45322, 53 per cent, 4.5 respectively.

Kachroo *et al.* (2010) in their study on the economic viability of ber cultivation in Jammu district revealed that the net present value of ber orchard was found to be Rs. 3951 and the internal rate of return was 16.17 per cent.

Bhat *et al.* (2011) conducted a study on economic appraisal of Kinnow production and its marketing under North-Western Himalayan Region of Jammu during the year 2009-10. The study revealed that the total establishment cost was Rs. 12,707 and the overall returns per acre from Kinnow orchards were Rs. 6632. The net present value, internal rate of return, benefit-cost ratio and payback period were found to be Rs. 7929, 15.42 per cent, 1.52 and 7.60 years respectively.

Ghosal and Das (2012) studied the suitability of a low-tech naturally ventilated greenhouse and evaluated for off-season cultivation of capsicum in warm and humid climate *i.e.* in coastal Odisha, Bhubaneswar because of its high demand during that period. The cultivation of this vegetable was tried in winter days of the year 2009-10. It was observed that the crop yield was more in the greenhouse during off-season as compared to the open field condition. The benefit cost ratio for capsicum in the greenhouse was 2.98 whereas it was 0.80 in case of open field condition. In this naturally ventilated type of greenhouse, the small and marginal farmers of Odisha were able to grow other vegetables during off-season which was found to be quite remunerative.

2.3 Marketing cost and price spread

Mahandule (1983) found the item wise average marketing cost of chrysanthemum produced in Ahmednagar district in Mumbai market. His study revealed that, the significant item of cost was the packaging charges contributing to the extent of 34.89 per cent of total marketing cost. The next items of marketing cost were commission (18.90per cent), transport cost and hundekari charges (19.5per cent). The other charges such as Vatav, Hamali, losses and postage together contributed to the extent of 17.45 per cent of the total marketing cost.

Dangat *et al.* (1985) studied economics of chrysanthemum in Maharashtra. The study revealed that per hectare cost of production in 1981-82 was Rs.34391, which was more than two fold over that in 1969-70. The main item in the total cost was the marketing cost during both the periods. Its share was 38 and 58 per cent of the total cost (cultivation cost+ marketing cost) during the respective years.

Subhramanyam (1983) studied the economics of production and marketing of marigold and chrysanthemum. He found that the marketing cost accounted for 49 and 43 per cent in respect marigold and chrysanthemum, respectively. The average returnsfrom cultivation of these crops showed high profitability.

Subhramanyam (1986) conducted study on the economics of production and marketing of chrysanthemum from Kolar district of Karnataka. He observed that the marketing cost accounted for nearly 44 per cent of the average total cost of cultivation showing the expenditure incurred for marketing the crop.

Tilekar and Nimbalkar (1999) did a study to evaluate the existing marketing practices Rose of cut flowers in Indian polyhouses (Maharashtra) and observed that the average price received for the sale of cut flowers in export markets was Rs. 10.44 per flowers with substantial margin of Rs. 3.59 per flower. In Europe, open action method of sale was followed while in Japan, the flowers were sold at prior fixed prices. The time of sale and stalk lengths had direct influence on the prices of Rose cut flowers in European markets.

Thorat (2001) studied price spread and marketing cost of chrysanthemum and observed that the producer's share in consumer's rupee was 47.43 per cent. The share of retailer was substantially large (39.02per cent) followed by whole sealer (4.74per cent), which affected the producers share in the consumer's rupee. She also observed that the marketing cost per kg was Rs. 3.05 of the total marketing cost, the items such as commission (71.18per cent) and transport charges (23.63per cent) were observed to the most important items of cost. Thus suggested these costs can be minimized through certain measures like efficient transport facilities and minimizing the market commission to be paid by the producer.

Jyothi and Raju (2002) examined the costs and margins of marketing crossandra, jasmine and Rose flowers through wholesalers-retailers in East Godavari district, Andhra Pradesh, India. Data were obtained from a sample of 90 farmers (30 for each flower crop), 5 wholesalers, and 5 retailers. The producer's share in consumer's rupee wasfound to be highest in crossandra (63.38per cent), followed by jasmine (58.06per cent), and Rose (50.00per cent). Wholesalers had higher margins in marketing Rose flowers (20.00per cent), followed by jasmine (19.51per cent), and crossandra (11.61per cent). Retailers also got more profits in marketing Rose (13.50per cent), followed by jasmine (12.09per cent), and crossandra (7.39per cent). For all three flowers, wholesalers had higher margins than retailers did.

Khade (2004) studied economics of production and marketing of marigold in Pune district. He found that, the cost on account of commission charges, transport and packing charges, were the major items of cost of marketing contributing to the extent of 56.45 per cent and 38.71 percent respectively.

Saraswati (2010) Marketing of Flowers in Karnataka: Infrastructure, Systems and Economics. It was observed that the flowers reached the market through various marketing channel for all the three flowers namely Rose, Gerbera and jasmine. It was found that producers share in Consumer rupee was higher in all the three flowers i.e. Rose, Gerbera and jasmine when he himself brought the product to market and sold to wholesaler or retailer rather than sale through the commission agents. It was highest when the producer sold directly to the retailer as observed in case of Rose (58per cent) and Gerbera (61.25per cent). Thus the shorter the marketing channel, the greater is the farmers share in consumer rupee and price spread was lower. Producers share in consumer rupee was highest in case of Rose followed by Gerbera and Jasmine. Alternately, price spread was lowest in Rose followed by Gerbera and Jasmine. Higher the price, lower is the producers share in consumer rupee. Among all the Channels, Marketing efficiency was highest for the Channel Producer –retailer –wholesaler. Hence this channel was found to be the most efficient. Marketing efficiency was lowest when commission agent was involved in the marketing channel. Both Rose and Gerbera were found to be market efficient flowers and fetched handsome returns. Efforts for direct marketing can be strengthened to get higher

profits. In case of jasmine, direct marketing by farmers is not being practices. It should be encouraged which may help them to get higher returns.

2.4 Constraints in production and marketing

Gowda Narayana (1988) in his study on export potential of cut flowers in India highlighted various constraints that were obstructing the growth of Indian floriculture industry such as non-availability of planting materials, lack of technical know-how, lack of infrastructure facilities, disorganized local market system, high freight charges and non-strict regulation by Government.

Pandey (1991) mentioned in his article that the technology for cultivation of export Roses was not available to farmers and thus, the Roses grown in the open area were not acceptable in the European market because of poor quality. Besides these, the performance of farmers to cater the domestic demand for cut flowers was dismal due to absence of standardized post-harvest technologies, poor marketing assistance and lack of arrangements for collection of cut flowers from small growers.

Van Tuvenhout and Stockman Rozen (1995) made a SWOT analysis (analysis of strength, weakness, opportunities and threat) for hi-tech Rose production in India. In that analysis, he mentioned that exploitation of vast local market as a good opportunity and on the other hand, over-production in the world market and too optimistic project reports are the major threats.

Gajanana and Subramanyam (1998) categorized problems of anthurium cultivators as production problems and marketing problems. In the production side, highcost and non-availability of quality planting materials, pest and diseases and in the marketing side, unorganized markets, non-availability and high cost of transportation, packing of flowers and exploitation by the traders were the major problems.

Mahesh (2000) studied the constraints in the tea exports using the Garrett's ranking technique. The results revealed that the lack of superior quality fronts in international market (phyto-sanitary measures), lack of export promotional measures, and existence of non- tariff barriers were the main constraints faced by the exporters in the export. Besides,

exim policy curbing teas imports, lack of infrastructural facilities, packaging and processing technologies were other constraints in the tea exports.

Sujatha *et al.* (2003) examined the constraints in the export of mangoes and found that export marketing required a sound and organized supply mechanism. Irradiation machines are required to provide quality mangoes. Careless packaging and the problems of spongy tissue and infestation by fruit fly and stone weevil lowered the quality.

Alagumani (2005) studied risks involved in tissue cultured and sucker propagated banana in Theni district of Tamil Nadu and reported that the risk in cultivation of banana using tissue culture plantlets was lower than that of sucker propagated banana production. The constraints in tissue culture banana production were high cost of tissue culture plantlets and few farmers also expressed problem in marketing of big size bunches obtained from tissue culture banana.

Thippaiah (2005) in his work on floriculture in Karnataka: performance prospects and problems reported the problems relating to modern floriculture and traditional sector. He classified constraints under production and marketing of flowers. Under modern floriculture sector, he found major production constraint was losses due to high overheads and high establishment costs compared to small units. Many of the units heavily depended on the imported technology and materials for installation of units. This had pushed the unit cost. Under marketing constraints information regarding the market trends in terms of opportunities for new varieties, value-added packaging and developments, taking place in other parts of the world was also not available to the growers. The other constraint was high freight charges, which were affecting the viability of the floricultural units. Under traditional sector, the major production constraint he found was the prices of pesticides, which were not only high, but also of sub-standard quality. Under marketing constraints, the prominent single constraint expressed was more commission followed by middlemen problem and deduction of more charges. Regarding market information, it was found that there was complete absence of market information on demand and prices.

Jethendra (2007) Observed that the major production problems faced by the hi-tech Rose growers were depreciation of greenhouse, restrictions in improving plant protection,

chemicals, high cost of planting materials etc. He concluded the use of resources found to be more in case of hi-tech Rose cultivation than field Rose because of its high intensive of land secondly; he remarked under hi-tech Rose, cost of production was more because of high investment.

Sudhagar (2013) The major problems faced in the production of cut-flowers as indicated by the hi-tech growers included huge investment in cut-flower production (reported by 83.63 per cent of the respondents), irregular supply of electricity required for irrigation (reported by 81.81 per cent), scarcity of labour (reported by 74.54 percent), non-availability of quality indigenous planting material (according to 67.27 per cent), poor harvest during the rainy season (opined by 63.63 per cent) and pest and disease attack on crops (reported by 47.27 per cent).With regard to marketing, the prominent constraints expressed by the sample growers included, seasonality in demand (reported by 96.36 per cent of the respondents), frequent power cuts affecting irrigation of the standing crop, adequate cold storage facilities (reported by 81.81 percent) and price fluctuations (54.54 per cent). Almost all the growers opined that there should be an exclusive flower market in Bangalore on modern lines with all requisite infrastructure facilities. The need for developing general infrastructure and setting up of cold storage facilities was expressed by the majority, i.e., 89.09 percent and 83.63 per cent respectively of the sample respondent

III METHODOLOGY

The present study focused on economics of Hi-Tech floriculture cultivation technology. The importance and utility of study depends upon reliability of the data collected and the soundness of the material and methods used in the study. This chapter deals with the structural framework of the study adopted for sample selection, data collection, analytical tools used and methods of interpreting results, etc. The methodology is presented under the following headings:

3.1 Basic approach

3.2 Sampling procedure

3.3 Nature and sources of data

3.4 Analysis of data

1.5 Definition of the terms and concepts used in the study

3.1: Basic approach

The major focused area of the study is to investigate into the "Hi-Tech floriculture units in Northern Karnataka", where, no such studies have been conducted. Accordingly, objectives were fixed to cover all necessary aspects of the study regarding per hectare resource use and cost of cultivation of Hi-Tech floriculture units crops by using the standard concepts in farm management studies. Utilizing the basic data material obtained in utilization of resources and the total costs was worked out. Further the total output and returns will explain the figures for cost of cultivation, cost of production and returns. The survey also covered marketing aspects viz., marketing functions, marketing margins and costs, intermediaries involved in the marketing channels. Production and marketing constraints faced by the farmers in Hi-Tech floriculture crops were studied.

3.2: Sampling procedure

The research procedure adopted to cover the above said objectives of the present study are discussed under the following sub points.

3.2.1: Selection of the area

The present study was conducted in Karnataka with special emphasis on Northern Karnataka. This is the most progressive part of agriculture in the state. Criteria for selecting are: a) Increasing trend in area under protected cultivation, b) Feasibility of commercial scale production, availability of markets for the produce and market driven production, c) suitability of the climate and environmental factors along with the supporting facilities of the local and national institutions/ department etc.

3.2.2: Selection of the sample farmers

As such the authenticated statistical information on the number of Hi-tech floriculture units established in the districts under study was not available in spite of the serious efforts made to gather information. The Hi-Tech floriculture units are established by the farmers with own funds, borrowed funds and also under various horticulture schemes from Government of India and Government of Karnataka. These Hi-Tech floriculture units which were established by the farmers with their own funds do not appear anywhere in the status of the horticulture department, those Hi-Tech floriculture units established under borrowed funds from various financial institutions also don't come to notice of the horticulture department; hence the horticulture department officials expressed their regret over compilation of Hi-Tech floriculture units in the districts. It was decided to compile the number of Hi-Tech floriculture units established and operated in the districts through gathering information from various sources like horticulture department, agencies involved in agriculture input, progressive farmers etc. so as to make a representative sample to go for investigation of the study. Hence, it was thought to go for post sampling of sample farmers. All the farmers from the study area i.e. totally 31 sample farmers were interviewed.

For the study, two districts of north Karnataka viz., Belagavi and Dharwad-Hubli were selected. From Belagavi district, 22 Gerbera units and from Dharwad-Hubli district, 8 Gerbera units and one Rose unit were selected. Totally, 31 hi-tech floriculture units were selected for the study.

3.3: Nature and source of data

A pre-tested schedule was specially designed for the collection of the data. The data collected in the schedule by survey method pertained to the agricultural year 2014-15. The details about the financial aspects of the sample firms were collected from the records maintained by the firms. Whereas the details about the production, resources used in the cultivation and output generated were collected from the field supervisors, assistant managers and other on-site workers. The details about the packaging and grading, marketing of flowers and prices realized were collected from the respective office records.

3.4: Analysis of data

To fulfil the specific objectives of the study, based on the nature and extent of availability of data, the following analytical tools and techniques have been adopted to draw meaningful interpretation and inferences.

3.4.1 Tabular analysis/ Budgeting technique

3.4.2 Financial feasibility analysis.

3.4.3 Garrett Ranking Technique

3.4.1: Tabular analysis/ Budgeting technique

Budgeting technique was followed for estimating the cost and returns in the production of Hi-Tech floriculture unit crops and tabular analysis was used to analyse the price spread and efficiency of different marketing channels of Hi-Tech floriculture unit crops.

3.4.2: Financial feasibility analysis

The techniques used for the financial analysis were:

1. Pay Back Period (PBP)

2. Net Present Value / worth (NPV)

3. Benefit-Cost Ratio (B: C Ratio)

4. Internal Rate of Return (IRR)

3.4.2.1: Pay Back Period (PBP)

Payback period represents the length of time required for the stream of cash proceeds produced by the investment to be equal to the original cash outlay *i.e.* the time required for the project to pay for itself. In the present study, payback period was calculated by successively deducting the initial investment from the net returns until the initial investment is fully recovered.

$$\text{Payback period} = \frac{\text{Initial investment}}{\text{Average annual net cash inflow}}$$

According to the payback criterion, the shorter the payback period, the more desirable is the project.

3.4.2.2: Net Present Value

The present value represents the discounted value of the net cash inflows to the project. In the present study, a discount factor of 12 per cent was used to discount the net cash inflows representing the opportunity cost of capital. It can be represented by

$$NPV = \sum_{i=1}^{n} Y_n(1 + r)^{-n} - I$$

Where,

Y_n = refers to the net cash inflows in the year n

r = refers to the discount rate.

I = Initial investment

The decision rule associated with the Net Present Value is, the project will be accepted if its value is positive and reject if its value is negative (if the net present value is zero, it is a matter of difference).

3.4.2.3 Benefit Cost Ratio

The Benefit Cost Ratio (BCR) was worked out by using following formula

$$\text{B: C ratio} = \frac{\text{Discounted cash inflow}}{\text{Discounted cash outflow}}$$

It measures the present value of returns per rupee of invested and it is a relative measure. The decision rule is that, accept the project, when BCR is greater than one, reject it when BCR is less than one and if BCR is zero, it is a matter of difference.

3.4.2.4: Internal Rate of Return (IRR)

The rate at which the net present value of project is equal to zero is Internal Rate of Return (IRR) to the project. The net cash inflows were discounted to determine the present worth following the interpolation technique. The method of interpolation followed is as under:

$$\text{IRR} = \left(\text{Lower discount Rate}\right) + \left(\text{Difference between two discount rates}\right) X \left(\frac{\text{Present worth of cash flow at lower Discount rate}}{\text{Absolute difference between the present worth of cash flows at the two discount rates}}\right)$$

Internal Rate of Return is a relative measure. To accept the project, the calculated IRR should be greater than the ongoing opportunity cost of capital.

3.4.3 Garrett Ranking Technique

To know the acceptance of farmers and constraints in production and marketing of hi-tech floriculture unit crops Garrett's ranking technique was used. Basically it gives the change of orders of constraints and advantages into numerical scores. The major advantage of this technique as compared to simple frequency distribution is that the constraints and advantages are arranged based on their importance from the point of view of respondents. Hence the same number of respondents on two or more constraints may have been given different rank. (Kumar and Pandey, 1999).

Garrett's formula for converting ranks into per cent was given by

$$\text{per cent position} = 100 * (R_{ij} - 0.5)/N_j$$

Where,

R_{ij}= rank given for i^{th} factor by j^{th} individual

N_j= number of factors ranked by j^{th} individual

The per cent position of each rank then converted into scores referring to the Table given by Garret and Woodswordh (1969). For each factor, the scores of individual respondents were added together and divided by the total number of the respondents for whom scores were added. These mean scores for all the factors were arranged in descending order, ranks were given and most important factors were identified

Garrett's ranking technique was adopted for studying problems faced by farmers in production and marketing.

3.3 Definition of the terms and concepts used in the study

3.5.1 Items of cost

The collected data were analysed by using different cost concepts viz., cost A, cost B, cost C and cost D normally used in the farm management studies.

Cost A: cost A includes the cost on account of hired human labour, Machine labour, value of manures, fertilizers, insecticides and pesticides, fertigation charges, depreciation on implements and machinery, land revenue, Apportioned establishment cost and interest on working capital.

Cost B: Comprises of cost A plus the imputed rental value of owned land and interest owned on fixed capital (excluding land).

Cost C: Comprises of cost B plus imputed value of family human labour. Thus the cost C represents the total cost of cultivation.

Cost D: Comprises of cost C plus marketing cost.

The methodology for valuation of different items of cost in estimation of cost of cultivation is as under.

1. Establishment cost

This includes the costs incurred in the establishment of hi-tech floriculture crop seedlings such as cost of land preparation, digging pits or trenching, planting material, manure, chemical fertilizer, plant protection chemicals, labour, etc. These costs were apportioned equally for every year of the life of the perennial crop. While the economic life of Rose was five years. Gerbera is having three years of economic life.

2. Human labour

For Hi-Tech floriculture crops, labourers were classified as hired labour and family labour. Labourers employed in the Hi-Tech floriculture crops were those who were having technical knowledge in cultivating the Hi-Tech floriculture crop. The actual wages paid to the hired labours were directly used for computation. Where, as the labour cost was imputed to the family labour based on the number of hours they worked in the farm and the existing wage rate.

3. Planting material

The planting materials purchased were valued at the actual cost paid by the farmers for hi-tech floriculture crop cultivators. The cost of seedlings multiplied in the farm itself was imputed based on the prevailing market rate. In case of hi-tech floriculture crop cultivation, the actual cost paid was accounted.

4. Manures

The cost of farm yard manure or compost produced on the farm was evaluated on the basis of rates prevailed in the village. The cost of manure purchased was accounted by considering to the actual price paid by the cultivators.

5. Fertilizers

The cost on account of fertilizers was worked out at the actual prices paid by the cultivators.

6. Insecticides and Pesticides

Insecticides and Pesticides were charged at the actual price paid by the cultivators.

7. Irrigation charges

It includes electricity charge or fuel (diesel) cost and /or flat rate paid for electricity. In case of Hi-Tech floriculture crop units, the controlled atmosphere should be maintained in greenhouse and cold storage rooms have to be operated round the clock. Hence, all the Hi-Tech floriculture units were having electrical installations as well as diesel operating generators for continuous power supply. Therefore, it is difficult to segregate operation-wise expenditure on this item. Hence, prevailing price for irrigation was considered.

8. Interest on fixed capital

Interest on fixed capital was charged at 14 per cent per annum for Hi-Tech floriculture crop cultivation. The rate at which financial institution lends to the farmers

of Hi-Tech floriculture crop growers was considered for the analysis (the interest was apportioned to crops based on the acreage). Interest on present value of fixed assets (excluding land) such as farm buildings, implements and equipments was charged at the rate of 14 per cent per annum.

9. Interest on working capital

Interest was charged at the rate of 7 per cent per annum on working capital viz., cash or kind expenditure (excluding items in respect of which payments are generally made after the harvest i.e. rent, land revenue, etc.) incurred during the period of cultivation.

10. Packing

The actual expenditure of packing material was accounted for this item. Material required for packing was corrugated boxes, plastic bags, tying materials etc.

11. Marketing and transportation

All the expenditure incurred after packing Hi-Tech floriculture units for market was accounted for transportation, commission, etc., were included in this item.

IV RESULTS

The results obtained from the analysis of the data are presented in this chapter under the following sub heads.

4.1 Socio-economic characteristics of sample farmers.

4.2 Investment analysis of hi-tech floriculture units

4.3 Cost and returns in cultivation of Hi-Tech floriculture units

4.4 Financial feasibility analysis of Hi-Tech floriculture units

4.5 Marketing cost and price spread of marketing channels

4.6 Value addition of Hi-Tech floriculture

4.7 Constraints in Hi-Tech floriculture unit's production and marketing.

1.1 Socio-economic characteristics of sample farmers.

The socio- economic characteristics of the sample farmers cultivating Hi-Tech floriculture crops are presented in Table 4.1. The results depicted that the average age of the sample respondents was 49 years and average family size was seven. About 83.87 per cent of the farmers had agriculture as their main occupation whereas 16.13 per cent of them had subsidiary occupation. With respect to education level of the farmers, majority of the farmers had pre-university (48.39 percent) level of education followed by high school (25.81 percent), primary (9.68 percent) and degree (6.45 percent). About 9.68 per cent of the farmers were illiterates. On an average, sample farmers had 3.2 hectare of owned land out of which 1.28 hectare was irrigated and 1.54 hectare was rainfed. Average area under Hi-Tech floriculture was found to be 0.38 hectare. The sample farmers had about 3 years of experience in hi-tech floriculture.

Table 4.1: Socio-economic characteristics respondents of Hi-Tech floriculture units.

Sl. No.	Particulars	Units	n=31
1	**Age**	Years	49
2	**Family size**	Number	7
3	**Occupation**		
	Main (Agriculture)	Number	26 (83.87)
	Subsidiary occupation	Number	5 (16.13)
4	**Education**		
	Illiterate	Number	3 (9.68)
	Primary	Number	3 (9.68)
	High school	Number	8 (25.81)
	Pre-University	Number	15 (48.39)
	Degree	Number	2 (6.45)
	Total		**31 (100.00)**
5	**Land holdings**		
	Total owned land	Hectare	3.2 (100.00)
	Irrigated	Hectare	1.28 (40.00)
	Rainfed	Hectare	1.54 (48.13)
	Area under Hi-tech floriculture	Hectare	**0.38 (11.88)**
6	**Experience in Hi-tech floriculture**	**Years**	**3.1**

Note: Figures in the parentheses indicate percentage to total

4.2 Investment analysis of Hi-Tech floriculture units

Under Hi-Tech floriculture flowers, Rose and Gerbera were considered for the study. The total establishment cost was divided into buildings and Hi-Tech floriculture unit, fertigation system and equipment, material cost and other cost. In case of Rose cultivation, total establishment cost was found to be 11038.65 thousand rupees out of which buildings and Hi-Tech floriculture units took a major share of 69.34 per cent (7654.8 thousand rupees) followed by material cost (23.49 per cent), other cost (3.64 per cent) and fertigation system and equipment (1.49 per cent). Among the buildings and Hi-Tech floriculture units, structure frame was highest and contributed to 56.90 per cent of the total establishment cost. Planting material contributed to 22.44 per cent of the establishment cost among the material cost.

With respect to Gerbera cultivation, 71.58 per cent of the total establishment cost was contributed from buildings and Hi-Tech floriculture units. Among which, 61.91 per cent of the investment was made on structure frame (6053.28 thousand rupees). Material cost accounted for 22.68 per cent followed by other costs (3.03 per cent) and fertigation system and equipment's (1.27 per cent). After the investment made on structure frame, planting material (2123.14 thousand rupees) and poly sheet (734 thousand rupees) were the major items of investment cost. The total establishment cost of per hectare of Gerbera cultivation was 9778.27 thousand rupees.

Table 4.2: Investment pattern in Hi-Tech floriculture unit (Rs.'000'/ha)

Sl. No.	Particulars	Rose	per cent	Gerbera	per cent
1	Structure frame	6280.52	56.90	6053.28	61.91
2	Polysheet	786.64	7.13	734.73	7.51
3	Shade net	148.12	1.34	108.24	1.11
4	Packaging structure	242.5	2.20	73.27	0.75
5	Office buildings	197.02	1.78	29.31	0.30
A	**Buildings and Hi-Tech floriculture unit**	**7654.8**	**69.34**	**6998**	**71.58**
6	Sprayers	22.5	0.20	17.95	0.18
7	Fertigation unit	164.53	1.49	124.66	1.27
8	Bore wells	196.46	1.78	118.95	1.22
9	Trolleys	5.52	0.05	3.58	0.04
B	**Fertigation system and equipment**	**389.06**	**3.52**	**265.14**	**2.71**
10	Generators	22.25	0.20	14.65	0.15
11	Fence	124.52	1.13	84.57	0.86
12	Electrical installation	96.21	0.87	78.64	0.80
13	Miscellaneous	158.74	1.44	118.44	1.21
C	**Other cost**	**401.72**	**3.64**	**296.3**	**3.03**
14	Labour	33.45	0.30	29.85	0.31
15	Plant material	2475.15	22.44	2123.14	21.71
16	Manure	24.81	0.22	18.59	0.19
17	Fertilizer	38.12	0.35	27.86	0.28
18	Plant protection chemical	21.54	0.20	18.55	0.19
D	**Material cost**	**2593.07**	**23.49**	**2218.00**	**22.68**
	Total establishment cost	**11038**	**100**	**9778.27**	**100**

4.3: Cost and returns in cultivation of Hi-Tech floriculture units.

Cost and returns in cultivation of Hi-Tech floriculture (Rose and Gerbera) are depicted in Table 4.3. The total cost of cultivation of one hectare of Rose and Gerbera was 5766.56 thousand rupees and 3237.80 thousand rupees respectively. In the cultivation of Rose, variable cost and fixed cost accounted for 71.64 per cent and 73.06 per cent respectively. Out of the total variable cost, total labour cost and total material cost amounted to 889.44 thousand rupees and 3173.86 thousand rupees respectively. Out of the labour cost, human labour accounted for a major share of 9.36 per cent (847.05thousand rupees) respectively. Among the material cost, marketing cost accounted for 46.04 per cent. In case of fixed cost, rental value of land amounted to 482.25 thousand rupees.

About 8897680 no of Roses were produced per hectare for one year. Total returns and net returns were found to be 29961.65 thousand rupees and 18126.48 thousand rupees respectively. Cost of production per Rose was worked out to be 1.21 rupees.

In the cultivation of Gerbera, variable cost and fixed cost were found to be 2365.58 thousand rupees (73.06 per cent) and 872.22 thousand rupees (26.93 per cent) respectively. Out of the total variable cost, total labour cost and total material cost amounted to 571 thousand rupees (10.11 per cent) and 1747.50 thousand rupees (3.91per cent) respectively. Out of the labour cost, a major share of 9.45 per cent (549 thousand rupees) was contributed from human labour and machine labour was only meagre (0.38 per cent). Among the material cost, marketing cost accounted for 46.12 per cent. In case of fixed cost, rental value of land amounted to 97.75 thousand rupees.

About 4799295 no of Gerbera flowers were produced per hectare for one year. Total returns and net returns were found to be 13233.00 thousand rupees and 5917.51 thousand rupees respectively. Cost of production per Gerbera was worked out to be 1.39 rupee

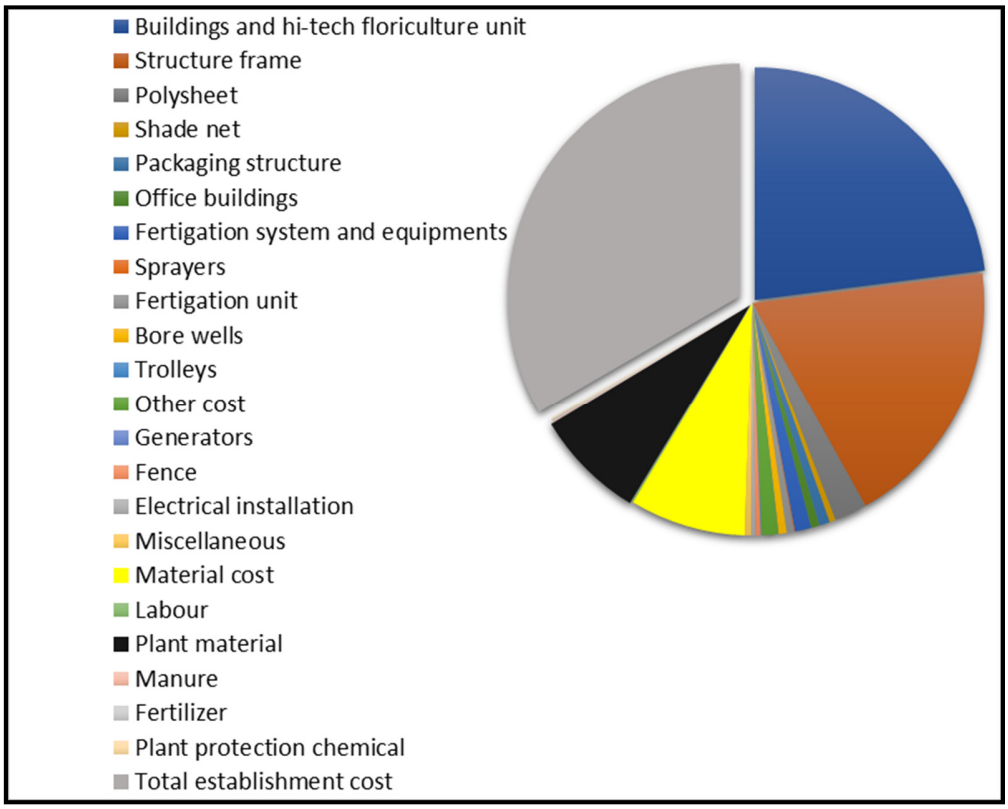

Fig. 1: Investment pattern in Hi-Tech floriculture unit (Rs.'000'/ha)

Table 4.3: Cost and returns of Hi-Tech floriculture unit (Rs. '000'/ha)

Sl. No.	Item of cost	Rose		Gerbera	
		Value (Rs.)	Percent	Value (Rs.)	Percent
I	**Variable cost**				
A	**Labour cost**				
1	Hired human labour				
	a. male	204.99	2.29	128	3.85
	b. female	472.89	5.28	301.56	5.18
2	Family labour				
	a. male	145.95	1.55	106.92	1.86
	b. female	23.22	0.24	24	0.40
	Total human labour (A)	**847.05**	**9.36**	**549**	**9.45**
3	Machine labour	42.39	0.38	22	0.66
	Total labour cost	**889.44**	**9.74**	**574**	**10.11**
B	**Material cost**				
1	Manures	7.79	0.09	7.05	0.12
2	Fertilizers	233.54	2.52	210.22	3.61
3	Insecticides and pesticides	42.58	0.48	28.34	0.49
4	Fertigation	10.83	0.16	7.88	0.14
5	Marketing cost	2879.12	46.04	1493.56	46.12
	Total material cost (B)	**3173.86**	**3.25**	**1747.50**	**3.91**
	Interest on working capital @ 7per cent	68.43	0.76	47.08	0.81
	Total variable cost (I)= A+B	**4131.73**	**71.64**	**2365.58**	**73.06**
II	**FIXED COST**				
1	Rental value of land	482.25	5.47	97.75	1.66
2	Land revenue	0.08	-	0.03	-
3	Depreciation	304.15	3.31	203.87	3.42
4	Interest on fixed capital @ 14per cent	848.35	9.47	49.21	9.80
	Total fixed cost (II)	**1634.83**	**20.83**	**872.22**	**26.93**
	TOTAL COST (I+II)	**5766.56**	**100**	**3237.80**	**100**
	Returns				
	Production (No.)	8897680		4799295	
	Price per flower	2.79		1.98	
	Total returns	29961.65		13233.00	
	Net returns	18126.48		5917.51	
	Cost of production per flower	1.21		1.39	

4.3 Financial feasibility analysis of Hi-Tech floriculture units

To evaluate the new technology i.e. Hi-Tech floriculture the cost benefit analysis was carried out. For studying the economic viability of the project net present worth, benefit-cost ratio, payback period and internal rate of returns were worked out and presented in Table 4.11. Since the net present value (NPV) and benefit cost ratio (B-C ratio) are function of the discount rate, these measures were obtained at 10 per cent 12 per cent and 15 per cent.

In Rose crop, The NPV at 10 per cent discount rate was Rs.17858 thousand, followed by Rs. 14151 thousand and Rs. 9960 thousand for 12 and 15 per cent, respectively. The B-C ratio was 1.63 for 10 per cent, whereas 1.55 and 1.44 for 12 and 15 per cent respectively. The payback period for Rose was 3.20 years and internal rate of return was 32 per cent. In Gerbera crop, The NPV at 10 per cent discount rate was Rs. 5977 thousand, followed by Rs. 4118 thousand and Rs. 2012 thousands for 12 and 15 per cent, respectively. The B-C ratio was 1.22 for 10 per cent, whereas 1.17 and 1.09 for 12 and 15 per cent respectively. The payback period for Gerbera was 5.25 years and internal rate of return was 19 per cent.

Table 4.4: Financial feasibility in Hi-Tech floriculture unit cultivation

Measurement of investment	**Rose**	**Gerbera**
A.Net present value		
Discounted rate		
10 per cent	17858	5977
12 per cent	14151	4118
15 per cent	9960	2012
B. Benefit-cost ratio		
Discounted rate		
10 per cent	1.63	1.22
12 per cent	1.55	1.71
15 per cent	1.44	1.09
C. Payback period(yrs.)	3.20	5.25

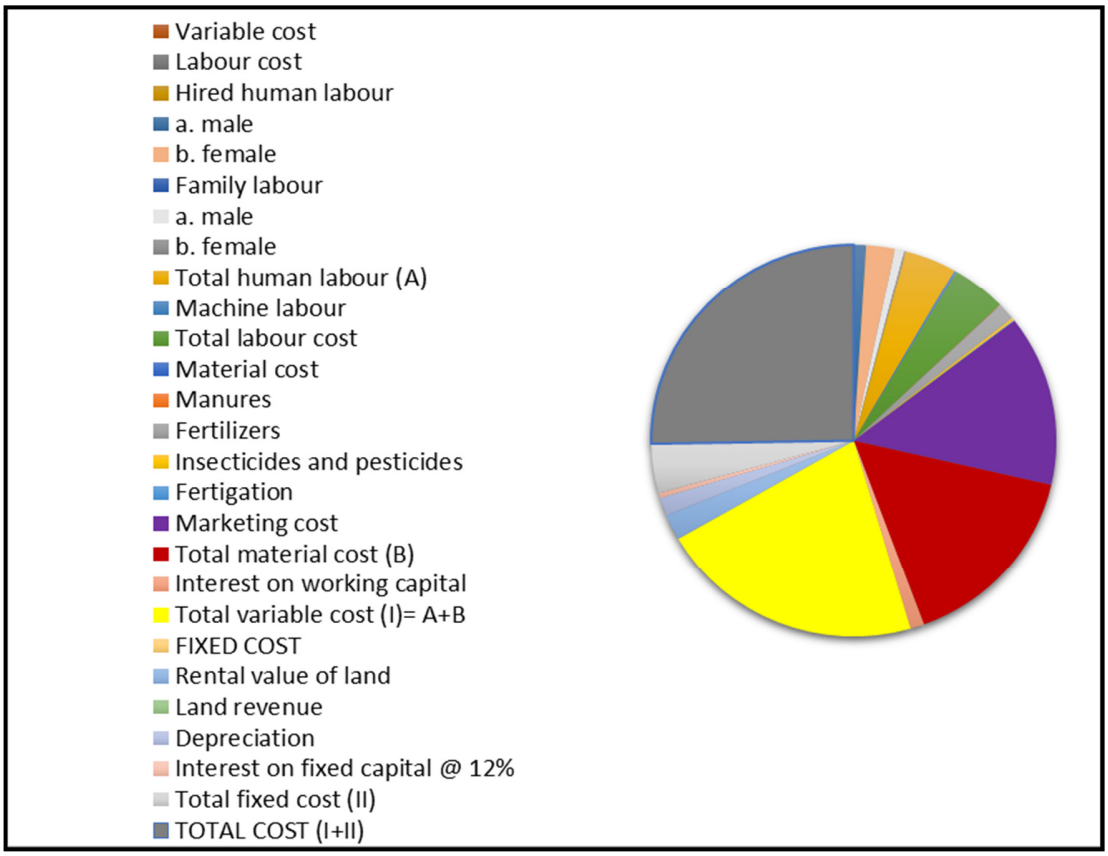

Fig. 2: Cost and returns in cultivation of Hi-Tech floriculture units (Rs.'000'/ha)

4.5 Marketing cost and price spread of marketing channels

The marketing cost incurred by the sample growers in the marketing of selected Hi-Tech floriculture units are presented in this section.

Marketing channels

Channel-I: Growers – Commission agents – Wholesalers – Retailers –Consumer

Channel-II: Growers – Retailers – Consumer

4.5.2 Marketing channels, marketing cost and price spread of Rose

Channel-II was identified i.e., Growers – Retailer – Consumer.

The marketing cost incurred by the growers and market intermediaries per 100 Rose flowers is depicted in Table 4.5 and Table 4.6. Growers incurred about 20 rupees for marketing 100 flowers and retailers incurred about 10 rupees. The growers incurred 6 Rs. for cleaning, 5 Rs. for packing, 3 Rs. Transportation charges, 3 Rs. For loading and unloading and losses during handling was amounted to Rs. 3. Whereas retailers incurred 2 Rs. for cleaning, 1 Rs. for packing, 3 Rs. transportation charges, 1 Rs. for loading and unloading and losses during handling was amounted to Rs. 3. The price received by the growers for 100 Roses was Rs. 445. Retailer's purchase price was Rs.445/ 100 Roses whereas retailer's selling price was Rs. 535/100 Roses in which they earned a profit of Rs. 80/100 flowers. The price spread was found to be 20.56 per cent and producer's share in consumer's rupee was 83.17 per cent.

Table 4.5: Costs incurred in marketing of rose (Per 100 flowers)

Sl. No.	Particulars	Growers		Retailer	
		Rs.	per cent	Rs.	per cent
1	Cleaning	6	30	2	20
2	Packing charges	5	25	1	10
3	Transport charges	3	15	3	30
4	Loading and unloading	3	15	1	10
5	Losses during handling	3	15	3	30
	Total	20	100	10	100

Table 4.6: Marketing margin and price spread in different channels of marketing of rose (Per 100 flowers)

Sl. No	Particulars	Channel II	
		Rs	per cent
1	Price received by producer	445	83.17
2	Net price received by Farmer	425	79.43
3	Marketing cost of:		
a	Producer	20	3.73
b	Commission agent	0	0
c	Wholesaler	0	0
d	Retailer	10	1.86
4	Commission agents purchase price	0	0
5	Profit of commission agents	0	0
6	Wholesaler purchase price	0	0
7	Wholesaler margin	0	0
8	Retailers purchase price	445	83.17
9	Retailer’s sale price	535	100.00
10	Retailers margin	80	14.95
11	Price spread	110	20.56
12	**Producer's share in consumer's rupee**		**83.17**

4.5.3 Marketing channels, marketing cost and price spread of Gerbera

In marketing of Gerbera, two marketing channels were identified viz.

Channel-I: Growers – Commission agents – Wholesalers – Retailers –Consumer

Channel-II: Growers – Retailers – Consumer

In marketing 100 Gerberas, growers, commission agents, wholesalers and retailers incurred a marketing cost of Rs. 21, Rs.12, Rs.7 and Rs.24 respectively. Commission agents and wholesalers didn't incur any cleaning and packing charges. Transportation cost was highest in case of commission agents (Rs. 6) followed by retailers (Rs. 6). Loading and unloading charges were high in case of growers (Rs.3) followed by commission agents (Rs. 3) and wholesalers (Rs. 2). Cost incurred on losses during handling was highest in case of retailers (Rs. 5) followed by commission agents (Rs. 3), growers (Rs. 7) and wholesaler (Rs. 2).

In Channel-I, price received by the producer for selling 100 Gerberas was 260 Rs. Commission agents purchase price was 260 Rs. and selling price was 335 Rs. in which commission agents incurred a profit of Rs. 63. Wholesalers purchase price was Rs. 335 and selling price was Rs. 375 and earned a profit of Rs.33. Retailers purchase price was Rs. 375 and selling price was Rs. 505 and earned a profit of Rs.106. In Channel-II, price received by the producer for selling 100 Gerberas was 325 Rs. Retailers purchase price was Rs. 325 and selling price was Rs. 505 and earned a profit of Rs.156.

Price spread was found to be Rs. 266 and Rs.201 in Channel-I and Channel-II respectively. Producer's share in consumer rupee was worked out to be 51.48per cent and 64.35 per cent respectively in Channel-I and Channel-II.

Table 4.7: Marketing cost incurred in marketing of gerbera (Per 100 flowers)

Sl. No.	Particulars	Growers		CA		Wholesaler		Retailer	
		Rs.	%	Rs.	%	Rs.	%	Rs.	%
1	Cleaning	3	14.28	0	0.00	0	0.00	6	25
2	Packing charges	3	14.28	0	0.00	0	0.00	3	12.5
3	Transport charges	5	23.80	6	50	3	42.84	6	25
4	Loading and unloading	3	14.28	3	25	2	28.57	4	16.66
5	Losses during handling	7	33.33	3	25	2	28.57	5	20.83
	Total	21	100.00	12	100.00	7	100.00	24	100.00

Table 4.8: Marketing margin and price spread in different channels of marketing gerbera (Per 100 flowers)

Sl.No	Particulars	Channel- I		Channel- II	
		Rs.	%	Rs.	%
1	Price received by producer	260	51.48	325	64.35
2	Net price received by producer	239	47.32	304	60.19
3	Marketing cost of:				
A	Producer	21	4.15	21	4.15
B	Commission agent	12	2.37	-	-
C	Wholesaler	7	1.38	-	-
D	Retailer	24	4.75	24	4.75
4	Commission agents purchase price	260	51.48	-	-
5	Profit of commission agents	63	12.47	-	-
6	Wholesaler purchase price	335	66.33	-	-
7	Profit of wholesaler	33	6.53	-	-
8	Retailers purchase price	375	74.25	325	64.35
9	Retailer's sale price	505	100.00	505	100.00
10	Profit of retailer	106	20.99	156	30.89
11	Price spread	266	52.67	201	39.80
12	**Producer's share in consumer's rupee**		**51.48**		**64.35**

4.6: Market potential of Hi-Tech floriculture flowers in domestic market.

Market potential of Hi-Tech floriculture units i.e., Rose and Gerbera are depicted in Table 4.9 and Table 4.10 respectively. The study showed that out of the total production of Rose (8897680), majority of the Roses produced were used for marriages, 40per cent (3559072) and other social events, 40per cent (3559072) and remaining were used for festivals 10per cent (889768) and by florists 10per cent (889768). Estimated value for Rose in domestic market, for marriages was 30.76per cent, a social event was 46.15per cent, a festival was 7.69per cent and florist was 15.38per cent.

In case of Gerbera also, out of the total production (4799295), 40 per cent (1919718) were used for marriages, 40 per cent (1919718) were used for social events, 10 per cent (479929) were used for festivals and remaining 10 per cent (479929) were supplied to florists. Estimated value for Gerbera in domestic market, for marriages was 30.76per cent, a social event was 46.15per cent, a festival was 7.69per cent and florist was 15.38per cent.

Table 4.9: Market potential of Hi-Tech floriculture flowers in domestic market for rose

Sl. No.	Particulars	%	Rose(Qty.)	Value(Rs.)	%
1	Marriages (Rs. 2)	40	3559072	7118144	30.76
2	Social events (Rs. 3)	40	3559072	10677216	46.15
3	Festivals (Rs. 2)	10	889768	1779536	7.69
4	Florist (Rs. 4)	10	889768	3559072	15.38
5	**Total Production**	**100**	**8897680**	**23133968**	**100**

Table 4.10: Market potential of Hi-Tech floriculture flowers in domestic market for gerbera

Sl. No.	Particulars	%	Gerbera (Qty.)	Value(Rs.)	%
1	Marriages (Rs. 2)	40	1919718	3839436	30.76
2	Social events (Rs. 3)	40	1919718	5759154	46.15
3	Festivals (Rs. 2)	10	479929	959858	7.69
4	Florist (Rs. 4)	10	479929	1919718	15.38
5	**Total Production**	**100**	**4799295**	**12478166**	**100**

4.7 Value addition of Hi-Tech floriculture flowers in domestic market.

The value addition was done mainly to Gerbera flowers, i.e., the Gerbera flowers were graded as grades (A, B). These grades were assorted by colour and the head of the flower. In Gerbera grade I was the diameter was about 10cm and stalk length of 50 cm. Grade II diameter of the below 10 cm and stalk of below 50 cm were categorized under II.

4.8: Constraints in Hi-Tech floriculture unit's production and marketing

The constraints faced by the farmers in production and marketing of Hi-Tech floriculture crops are depicted below.

4.8.1: Production problems encountered by Hi-tech floriculture units

Production problems encountered by Hi-tech floriculture units in the study area are presented in Table 11. The study identified nine constraints out of which the major constraints faced were High incidence of pest and diseases (Rank I), High cost of maintenance (Rank II) and High rate of plant protection measures (Rank III). Other constraints as opined by the farmers were Lack of technical guidance, Lack of credit facility, High wage rate, High cost of planting material, Non-availability of skilled labour, and Non-availability of pesticides.

Table.11: Production problems encountered by Hi-tech floriculture units

Sl. No.	Particulars	Rank	Score (n=31)
1	High incidence of pest and diseases	1	69.83
2	High cost of maintenance	2	44.07
3	High rate of plant protection measures	3	34.8
4	Lack of technical guidance	4	33.23
5	Lack of credit facility	5	27.33
6	Wage rate	6	24.23
7	Cost of planting material	7	21.13
8	Non-availability of skilled labour	8	18.03
9	Non-availability of pesticides	9	6.03

4.8.2 Marketing problems faced by farmers

Marketing problems faced by the farmers in marketing hi-tech floriculture crops in the study area are presented in Table 4.12. The study identified nine constraints out of which the major constraints faced were High commission charges (Rank I), Low demand in local market (Rank II) and Lack of market information (Rank III). Other constraints as opined by the farmers were No incentives from government, High packing cost, Problems in transportation, Lack of regulated market, Lack of grading and standardization and Lack of storage facilities.

Table.12: Marketing problems faced by farmers

Sl. No.	Particulars	Rank	Score (n=31)
1	High commission charges	1	76.2
2	Low demand in local market	2	73.57
3	Lack of market information	3	54.43
4	No incentives from government	4	47.3
5	Packaging cost	5	46.2
6	Problems in transportation	6	42.53
7	Lack of regulated market	7	38.9
8	Lack of grading and standardisation	8	34.73
9	Lack of storage facilities	9	30.07

V DISCUSSION

The results of the investigation presented in the preceding chapter are discussed in detail in this chapter. The main focus here is to throw light on some of the causes responsible for the major trends observed in the findings. This kind of analysis is hoped to identify such of the policy measures and execute corrections that can be implemented to overcome the constraints encountered by Hi-Tech floriculture crops growers. Keeping objectives of the study in view the results are discussed under the following heads:

5.1 Socio-economic characteristics of sample farmers.

5.2 Investment analysis of Hi-Tech floriculture units

5.3 Cost and returns in cultivation of Hi-Tech floriculture units

5.4 Financial feasibility analysis of Hi-Tech floriculture units

5.5 Marketing cost and price spread of marketing channels

5.6 Value addition of Hi-Tech floriculture units

5.7 Constraints in Hi-Tech floriculture unit's production and marketing.

5.1 Socio-economic characteristics of sample farmers.

The socio- economic characteristics of the sample farmers cultivating Hi-Tech floriculture units are presented in Table 4.1. The results depicted that the average age of the sample respondents was 49 years and average family size was seven. About 83.87 per cent of the farmers had agriculture as their main occupation whereas 16.13 per cent of them had subsidiary occupation, which indicated that agriculture was the main source of income for the sample farmers. With respect to education level of the farmers, majority of the farmers had pre-university (48.39 percent) level of education followed by high school (25.81 percent), primary (9.68 percent) and degree (6.45 percent). About 9.68 per cent of the farmers were illiterates. The education level indicated that majority of the Hi-Tech floriculture crop growers were educated. On an average, sample farmers had 3.2 hectare of owned land out of which 1.28 hectare was irrigated and 1.54 hectare was rainfed. Average

area under Hi-Tech floriculture was found to be 0.38 hectare. The sample farmers had about 3 years of experience in Hi-Tech floriculture.

5.2 Investment analysis of Hi-Tech floriculture units.

Under Hi-Tech floriculture crops, Rose and Gerbera were considered for the study. The total establishment cost was divided into buildings and Hi-Tech floriculture unit, fertigation system and equipment, material cost and other cost. In case of Rose cultivation, total establishment cost was found to be 11038 thousand rupees out of which buildings and Hi-Tech floriculture units took a major share of 69.34 per cent (7654.8 thousand rupees) followed by material cost (23.49per cent), other cost (3.64per cent) and fertigation system and equipment's (3.52 per cent). Among the buildings and Hi-Tech floriculture units, structure frame was highest and contributed to 56.90 per cent of the total establishment cost as the structure frames were made of metal and the quality of structure frame material should be best enough to sustain the climatic variations. Planting material contributed to 22.44 of the establishment cost among the material cost because they had to import them by paying royalties from the exporting country which makes plant material costly. With respect to Gerbera cultivation, 71.48 per cent of the total establishment cost was contributed from buildings and Hi-Tech floriculture units. Among which, 61.91 per cent of the investment was made on structure frame (6053.28 thousand rupees). Material cost accounted for 22.68 per cent followed by other costs (3.03 per cent) and fertigation system and equipment's (2.71 per cent). Cultivation of crops under Hi-Tech floriculture required fertigation units where most of the fertilizers used were water soluble and these fertilizers have to be supplied with irrigation After the investment made on structure frame, planting material (2123.14 thousand rupees) and poly sheet (734.73 thousand rupees) were the major items of investment cost. The total establishment cost of per hectare of Gerbera cultivation was 9778.27 thousand rupees.

5.3 Cost and returns in cultivation of Hi-Tech floriculture crops

Cost and returns in cultivation of Hi-Tech floriculture crops (Rose and Gerbera) are depicted in Table 4.3. The total cost of cultivation of one hectare of Rose and Gerbera was 5766.56 thousand rupees and 3237.80 thousand rupees respectively. In the cultivation of

Rose, variable cost and fixed cost accounted for 71.64per cent and 20.83 per cent respectively. And in the cultivation of Gerbera, variable cost and fixed cost were found to be 2365.58 thousand rupees (73.06 per cent) and 872.22 thousand rupees (26.93per cent) respectively.

Out of the total variable cost, total labour cost was the highest in case of both Rose (889.44 thousand rupees) and Gerbera (571 thousand rupees) as these Hi-Tech floriculture units being commercial cultivation of crops where intensive use of hired labour had observed for timely operation of cultural practices and to carry out harvesting/picking operations. In Hi-Tech floriculture units the productivity was very high responsive to the fertilizer use, where its share to the total cost of cultivation was 2.52 and 3.61per cent respectively for Rose and Gerbera. Among the material cost, marketing cost accounted for about 50 per cent of the total cost of cultivation because Hi-Tech floriculture crop's products were marketed by using good packing material to create its demand in the market. Among the fixed cost, in both Rose and Gerbera cultivation, rental value of land was amounted to 482.25 thousand rupees and 97.75 rupees respectively which was high as the study area was nearer to the city places which had increased the rental value of land around.

About 8897680 of Roses and 4799295 of Gerberas were produced per hectare for one year. Since, Hi-Tech floriculture units use the advanced technology which favoured the crops and employed more resources, they realized more yield per hectare and earned good returns. Total returns and net returns were found to be 29961.65 thousand rupees and 18126.48 thousand rupees respectively in case of Rose cultivation and total returns and net returns were found to be 13233.00 thousand rupees and 5917.51 thousand rupees respectively in case of Gerbera cultivation. The returns were dependent on season wise market demand, according to that there was price fluctuation for produce. Cost of production per Rose and Gerbera was worked out to be 1.52 rupees and 2.33 rupees respectively. Both the cost and returns were found to be high in case of Rose compared to Gerbera cultivation.

5.4 Financial feasibility analysis of Hi-Tech floriculture units

The cultivation of Hi-Tech floriculture crops involved more fixed capital, it was necessary to take into account the income stream for the whole life span of Hi-Tech floriculture unit. For studying the economic viability of the project net present worth, benefit-cost ratio, payback period and internal rate of returns were worked out and presented in Table 4.4. Since the net present value (NPV) and benefit cost ratio (B-C ratio) are function of the discount rate, these measures were obtained at 10per cent,12per cent and 15per cent.

The Net Present Value (NPV) was worked out to be Rs. 17859 (10per cent) thousand Rs.14152 (12per cent) thousand rupees and 9961 (15per cent) thousand rupees respectively in case of Rose. The Net Present Value (NPV) was worked out to be Rs. 5978 (10per cent) thousand Rs.4117 (12per cent) thousand rupees and 2012 (15per cent) thousand rupees respectively in case of Gerbera.

Benefit – Cost ratio (BCR) was calculated for 10per cent, 12per cent and 15per cent and the values were, 1.63, 1.55 and 1.44 respectively for Rose which indicated that Hi-Tech floriculture cultivation was profitable. In Gerbera Benefit – Cost ratio (BCR) was calculated for 10per cent 12per cent and 15per cent and the values were 1.22, 1.17 and 1.09 respectively. This indicated that Hi-Tech floriculture cultivation was profitable. The IRR was worked out to be 32 per cent and 19per cent for Rose and Gerbera respectively which were higher than the prevailing long term interest rate. Short period of time or less number of years was required to recover the investment made in the cultivation of Hi-Tech floriculture crops i.e., in case of Rose payback period (PBP) was 3.20 years and 5.25 years in Gerbera cultivation. All these results concluded that the cultivation of Hi-Tech floriculture flowers viz., Rose and Gerbera cultivation was financially feasible and economically viable for the farmers.

5.5 Marketing cost and price spread of marketing channels

Production of any farm commodity completes only when it reaches to the ultimate consumer. The marketing process, therefore, has been regarded as a part and parcel of the production activity. It is said that the Indian farmer is a good producer but a bad marketer.

The ultimate success in marketing of any commodity largely depends upon the ease and significance in the marketing of flowers. The flowers are highly perishable and hence the study of marketing organizations and the various market functionaries involved in marketing of flowers is rather important. Due to the peculiarities of agricultural products, they pose a number of problems in handling, transporting and marketing.

In marketing of Rose, one marketing channel was identified i.e., Farmer – Retailer – Consumer. Where as in case of Gerbera, two marketing channels were identified viz., Channel-I: Growers – Commission agents – Wholesalers – Retailers – Consumer and Channel-II: Growers – Retailers – Consumer. In Channel- I in case of Gerbera, there were more intermediaries and through this channel bulk amount of the produce was transacted in the study area. The yield from Hi-Tech floriculture crops were regular and daily basis, so it was very much needed to get the market continuously. The commission agents and wholesalers were permanent market players so farmers supplied their produce through this Channel- I. In Channel- I of Rose and Channel-II of Gerbera, farmers themselves supplied the produce to retailers by incurring transportation cost which gave them good returns when compared to selling the produce through Commission agents and wholesalers.

The price received by the growers for 100 Roses was Rs. 445. Retailer's purchase price was Rs.445/ 100 Roses whereas retailer's selling price was Rs. 535/100 Roses in which they earned a profit of Rs. 80/100 flowers. Whereas, in case of Gerbera, in Channel-I, price received by the producer for selling 100 Gerberas was 260 Rs. Commission agents purchase price was 260 Rs. and selling price was 335 Rs. in which commission agents incurred a profit of Rs. 63. Wholesalers purchase price was Rs. 335 and selling price was Rs. 375 and earned a profit of Rs.33. Retailer's purchase price was Rs. 375 and selling price was Rs. 505 and earned a profit of Rs.106. In Channel-II, price received by the producer for selling 100 Gerberas was 325 Rs. Retailer's purchase price was Rs. 325 and selling price was Rs. 505 and earned a profit of Rs.156.

In both Rose and Gerbera marketing, price spread was found to be less i.e. Rs. 110 and Rs.201 respectively for Rose and Gerbera when farmers sold their produce through retailers. Producer's share in consumer's rupee was found to be high i.e., 83.17per cent and 64.12 per cent respectively for Rose and Gerbera when farmers sold their produce

through retailers. Hence, the study concluded that the farmers were profitable when they sold their produce directly to retailers.

5.6 Market potential of Hi-Tech floriculture flowers in domestic market.

Market potential of Hi-Tech floriculture units i.e., Rose and Gerbera are depicted in Table 4.9 and Table 4.10 respectively. The study showed that out of the total production of Rose (8897680), majority of the Roses produced were used for marriages, 40per cent (3559072) and other social events, 40per cent (3559072) and remaining were used for festivals 10per cent (889768) and by florists 10per cent (889768). Estimated value for Rose in domestic market, for marriages is 30.76per cent, a social event is 46.15per cent, a festival is 7.69per cent and florist is 15.38per cent.

In case of Gerbera also, out of the total production (4799295), 40 per cent (1919718) were used for marriages, 40 per cent (1919718) were used for social events, 10 per cent (479929) were used for festivals and remaining 10 per cent (479929) were supplied to florists. Estimated value for Gerbera in domestic market, for marriages is 30.76per cent, a social event is 46.15per cent, a festival is 7.69per cent and florist is 15.38per cent.

5.7 Value addition of Hi-Tech floriculture flowers in domestic market.

The value addition was done mainly to Gerbera flowers, i.e., the Gerbera flowers were graded as grades (A, B). These grades were assorted by colour and the head of the flower. In Gerbera grade I was the diameter was about 10 cm and stalk length of 50cm. Grade II diameter of the below 10 cm and stalk of below 50 cm were categorized under II.

5.8 Constraints in Hi-Tech floriculture crops production and marketing

The constraints faced by the farmers in production and marketing of Hi-Tech floriculture crops are depicted below.

5.8.1 Production problems encountered by Hi-Tech floriculture units

Production problems encountered by Hi-Tech floriculture units in the study area are presented in Table 11. The study identified nine constraints out of which the major constraints faced were high incidence of pest and diseases (Rank I) because in Hi-Tech

floriculture units' favourable climatic condition prevailed where pest and diseases will multiply so farmers took the regular plant protection chemical spray to avoid the pest and diseases problem which made the costly task. High cost of maintenance (Rank II) as Hi-Tech floriculture units were favourable to tear under harsh climatic conditions so maintenance cost was relatively more and high rate of plant protection measures (Rank III). Other constraints as opined by the farmers were lack of technical guidance, as Hi-Tech flower cultivation required special skills, Lack of credit facility (the huge amount of establishment cost was required to adopt the Hi-Tech floriculture and credit availability would make it a affordable venture), High wage rate (Hi-Tech floriculture crop cultivation was more commercial so it required more number of regular and permanent labour so the wage rates were higher), High cost of planting material (farmers had to import them by paying royalties from the exporting country which makes plant material costly), Non-availability of skilled labour (working in Hi-Tech floriculture unit required technical skills to carry out the special practices like pruning, pinching, removing of leaves and harvesting) and Non-availability of pesticides (timely availability of protection measures were lacking in the study area).

5.8.2 Marketing problems faced by farmers

Marketing problems faced by the farmers in marketing Hi-Tech floriculture crops in the study area are presented in Table 4.12. The study identified nine constraints out of which the major constraints faced were high commission charges (Rank I) as farmers incurred more cost when they sold their produce through commission agents, low demand in local market (Rank II) as the Hi-Tech floriculture crops produce had high demand in the western countries compared to local market and lack of market information (Rank III) because the demand for flowers normally depends on the season so the farmers faced the problem of market information. Other constraints as opined by the farmers were no incentives from government (sometimes there was completely no demand for the flowers at that time produce was completely wasted and farmers demand for government support/incentives under such situation), high packing cost (to make the flower attractive, which increased demand in packaging material used made them expensive), problems in transportation (transportation cost having major share in the total marketing cost), lack of

regulated market (as Hi-Tech floriculture crops were regularly supplied there was a lack of regulated market facility which forced them to sell their produce to the market intermediaries), lack of grading and standardization (to carry out exporting activity by farmer himself) and lack of storage facilities (flowers being perishable commodity the produce may lose its charm so farmers faced lack of cold storage facility in the study area where they can store their produce to get good returns in future) is need of proper and timely particularly on information regarding grading and standardization, problems in transportation (VIII) as transportation cost having major share in the total marketing cost and high packaging cost (IX) to make the flower attractive made increase its demand packaging material used which made them expensive. The similar results were observed in studies carried out by Jethendra (2007) reported that hundred per cent of the farmers responded that storage facility was the major problem and lack of domestic market facility (33.33per cent). Saraswati (2010) reported that, much unorganized market, lack of storage facility, lack of market information.

VI SUMMARY

Floriculture has emerged as an important agribusiness, providing employment opportunities and entrepreneurship in both urban and rural areas. National Horticulture Board helps one to establish a flower business. Agricultural and Processed Food Products Export Development Authority helps entrepreneurs with cold storage facilities and freight subsidies. It has been found that Commercial Floriculture has higher potential per unit area than most of the field crops and therefore a lucrative business. During the last decade, there has been a thrust on export of cut flowers. The export surplus has found its way into the local market influencing people in cities to purchase and use flowers in their daily lives. Floriculture thus, offers a great opportunity to farmers in terms of income generation and empowerment. Small and marginal farmers may also use every inch of their land for raising the flower and foliage crops. Floriculture also offers careers in production, marketing, export and research. One can find employment in the floriculture industry as a farm manager, plantation expert, supervisor or project coordinator. Besides, one can work as consultant or landscape architect with proper training. In addition, floriculture also provides career opportunities in service sector which include such jobs as floral designers, landscape designers, landscape architects and horticultural therapists. The present study made an effort in the direction of having an integrated study of all aspects of production and marketing of major crops grown in protected cultivation technology and to identify the problems faced in its cultivation and marketing with an overall view of exploring the possibilities and potentialities for bringing about the required improvement.

In case of Rose cultivation, total establishment cost was found to be 11038 thousand rupees out of which buildings and hi-tech floriculture units took a major share of 69.34 per cent (7654.8 thousand rupees) followed by material cost (23.49 per cent), other cost (3.64per cent) and fertigation system and equipment's (3.52 per cent). Among the buildings and hi-tech floriculture units, structure frame was highest and contributed to 56.90per cent of the total establishment cost. Planting material contributed to 22.44 of the establishment cost among the material cost. With respect to Gerbera cultivation, 71.58 per cent of the total establishment cost was contributed from buildings and hi-tech floriculture units. Among which, 61.91 per cent of the investment was made on structure frame

(6053.28thousand rupees). Material cost accounted for 22.68 per cent followed by other costs (3.03 per cent) and fertigation system and equipment's (2.71 per cent). After the investment made on structure frame, planting material (2123.14 thousand rupees) and poly sheet (734.73 thousand rupees) were the major items of investment cost. The total establishment cost of per hectare of Gerbera cultivation was 9778.27 thousand rupees.

The total cost of cultivation of one hectare of Rose and Gerbera was 5766.56 thousand rupees and 3237.80 thousand rupees respectively. In the cultivation of Rose, variable cost and fixed cost accounted for 71.64per cent and 20.83 per cent respectively. Out of the total variable cost, total labour cost and total material cost amounted to 889.44 thousand rupees and 3173.86 thousand rupees respectively. Out of the labour cost, human labour accounted for a major share of 9.36 per cent (847.05 thousand rupees) respectively. Among the material cost, marketing cost accounted for 56.04 per cent. In case of fixed cost, rental value of land amounted to 482.25 thousand rupees. About 8897680 no. of roses were produced per hectare for one year. Total returns and net returns were found to be 29961.65 thousand rupees and 18126.48 thousand rupees respectively. Cost of production per Rose was worked out to be 2.33 rupees.

In the cultivation of Gerbera, variable cost and fixed cost were found to be 2365.58 thousand rupees (73.06 per cent) and 872.22 thousand rupees (26.93 per cent) respectively. Out of the total variable cost, total labour cost and total material cost amounted to 571 thousand rupees (10.11 per cent) and 1747.50 thousand rupees (3.91 per cent) respectively. Out of the labour cost, a major share of 9.45 per cent (549 thousand rupees) was contributed from human labour and machine labour was only meagre (0.66 per cent). Among the material cost, marketing cost accounted for 46.12 per cent. In case of fixed cost, rental value of land amounted to 97.75 thousand rupees. About 4799295 no. of gerbera were produced per hectare for one year. Total returns and net returns were found to be 13233.00 thousand rupees and 5917.51 thousand rupees respectively. Cost of production per Rose was worked out to be1.52 rupees.

The Net Present Value (NPV) was worked out to be Rs. 17859 (10per cent) thousand Rs.14152 (12per cent) thousand rupees and 9961(15per cent) thousand rupees respectively in case of Rose. The Net Present Value (NPV) was worked out to be Rs. 5978

(10per cent) thousand Rs.4117 (12per cent) thousand rupees and 2012 (15per cent) thousand rupees respectively in case of Gerbera.

Benefit – Cost ratio (BCR) was calculated for 10per cent, 12per cent and 15per cent and the values were, 1.63, 1.55 and 1.44 respectively for Rose which indicated that Hi-Tech floriculture cultivation was profitable. In gerbera Benefit – Cost ratio (BCR) was calculated for 10per cent 12per cent and 15per cent and the values were 1.22, 1.17 and 1.09 respectively. This indicated that Hi-Tech floriculture cultivation was profitable. The IRR was worked out to be 32 per cent and 19per cent for Rose and Gerbera respectively which were higher than the prevailing long term interest rate. Shorter time or less number of years was required to recover the investment made in the cultivation of Hi-Tech floriculture crops i.e., in case of Rose payback period (PBP) was 3.20 years and 5.25 years in Gerbera cultivation. All these results concluded that the cultivation of Hi-Tech floriculture flowers viz., Rose and Gerbera cultivation was financially feasible and economically viable for the farmers.

In marketing of Rose, one marketing channel was identified i.e., Farmer – Retailer – Consumer. Growers incurred about 20 rupees for marketing 100 flowers and retailers incurred about 10 rupees. The growers incurred 6 Rs. for cleaning, 5 Rs. for packing, 3 Rs. Transportation charges, 3 Rs. For loading and unloading and losses during handling was amounted to Rs. 3. Whereas retailers incurred 2 Rs. for cleaning, 1 Rs. for packing, 3 Rs. transportation charges, 1 Rs. for loading and unloading and losses during handling was amounted to Rs. 3. The price received by the growers for 100 Roses was Rs. 445. Retailer's purchase price was Rs.445/ 100 Roses whereas retailer's selling price was Rs. 535/100 Roses in which they earned a profit of Rs. 80/100 flowers. The price spread was found to be 20.56 per cent and producer's share in consumer's rupee was 83.17 per cent.

In marketing of 100 Gerberas, growers, commission agents, wholesalers and retailers incurred a marketing cost of Rs. 21, Rs.12, Rs 7 and Rs.24 respectively. Commission agents and wholesalers didn't incur any cleaning and packing charges. Transportation cost was highest in case of commission agents (Rs. 6) followed by retailers (Rs. 6). Loading and unloading charges were high in case of growers (Rs.3) followed by commission agents (Rs. 3) and wholesalers (Rs. 2). Cost incurred on losses during

handling was highest in case of retailers (Rs. 5) followed by commission agents (Rs. 3), growers (Rs. 7) and wholesaler (Rs. 2). In Channel-I, price received by the producer for selling 100 Gerberas was 312 Rs. Commission agents purchase price was 260 Rs. and selling price was 335 Rs. in which commission agents incurred a profit of Rs. 63. Wholesalers purchase price was Rs. 335 and selling price was Rs. 375 and earned a profit of Rs.33. Retailers purchase price was Rs. 375 and selling price was Rs. 505 and earned a profit of Rs.106. In Channel-II, price received by the producer for selling 100 Gerberas was 325 Rs. Retailers purchase price was Rs. 325 and selling price was Rs. 505 and earned a profit of Rs.156. Price spread was found to be Rs. 266 and Rs.201 in Channel-I and Channel-II respectively. Producer's share in consumer rupee was worked out to be 51.48 per cent and 64.35 per cent respectively in Channel-I and Channel-II.

Market potential of Hi-Tech floriculture units i.e., Rose and Gerbera are depicted in Table 4.9 and Table 4.10 respectively. The study shows that out of the total production of Rose (8897680), majority of the Roses produced were used for marriages, 40per cent (3559072) and other social events, 40per cent (3559072) and remaining were used for festivals 10per cent (889768) and by florists 10per cent (889768). Estimated value for Rose in domestic market, for marriages was 30.76per cent, a social event was 46.15per cent, a festival was 7.69per cent and florist was 15.38per cent.

In case of Gerbera also, out of the total production (4799295), 40 per cent (1919718) were used for marriages, 40 per cent (1919718) were used for social events, 10 per cent (479929) were used for festivals and remaining 10 per cent (479929) were supplied to florists. Estimated value for Gerbera in domestic market, for marriages was 30.76per cent, a social event was 46.15per cent, a festival was 7.69per cent and florist was 15.38per cent.

The value addition was done mainly to Gerbera flowers, i.e., the Gerbera flowers were graded as grades (A, B.) These grades were assorted by colour and the head of the flower. In Gerbera grade I was the diameter was about 10cm and stalk length of 50cm. Grade II diameter of the below 10cm and stalk of below 50cm were categorized under II.

The study identified nine constraints out of which the major constraints faced were High incidence of pest and diseases (Rank I), High cost of maintenance (Rank II) and High rate of plant protection measures (Rank III). Other constraints as opined by the farmers were Lack of technical guidance, Lack of credit facility, High wage rate, High cost of planting material, Non-availability of skilled labour, and Non-availability of pesticides.

The study identified nine constraints out of which the major constraints faced were High commission charges (Rank I), Low demand in local market (Rank II) and Lack of market information (Rank III). Other constraints as opined by the farmers were No incentives from government, High packing cost, Problems in transportation, Lack of regulated market, Lack of grading and standardization and Lack of storage facilities.

6.1 Policy implications

The cost of Hi-Tech floriculture structures ranged from nearly 53 to 89 per cent of the total establishment cost in case of Hi-Tech floriculture crop cultivation i.e. 70 to 100 lakhs. Which became quite burden to farmer's respondents. So, the Govt. needs to encourage developing Hi-Tech floriculture structures using indigenous technologies with low cost materials like good quality galvanized iron (G.I.) pipes.

Planting material cost in the total establishment cost ranged from 35 to 58 percent. Planting material of high quality needs to be made available to the farmers at affordable rates to increase the use by farmers and to increase their profitability. There is a need to develop indigenous varieties instead of importing the foreign costly planting material and also subsidy needs to be provided for planting materials.

Human labour, machine labour, fertilizers and pesticides were the major contributors to the Hi-Tech floriculture unit output. Therefore, timely supply of these quality inputs to the farmers may be ensured. Whereas, water soluble fertilizers cost was very high so it needs to be subsidized.

Hi-Tech floriculture was very much dependent on hired human labour so the agricultural engineering department needs to fabricate different models of power operated machines suitable to different kind of utilities with lower cost.

The inputs except PPC were underutilized, so the use of resources like human labour, fertilizers, FYM and fertigation can be increased to optimize the resource use and get maximum returns in Hi-Tech floriculture crop cultivation.

The marketing Channel I was observed less efficient because of more number of intermediaries, whereas Channel III was more efficient compared to other channels so farmers are advised to sell their produce through Channel III.

It has been observed that lack of market information and organized markets were major problems and there had been very wide fluctuations in prices. In order to regulate the prices throughout the year to save the producers as well as consumers from the hardship the Government needs to fix the support prices as well as ceiling prices at a level fair to both the producer' as well as consumer. Flowers need to be placed under notified commodity and a regulated market yard for flowers needs to be established. Karnataka State Agricultural Marketing Board/ Department of Agricultural Marketing needs to take a proactive role in this regard.

Based on financial analysis, these Hi-Tech flowers have good commercial potential and the area under Hi-Tech flowers have been increased by encouraging the farmers. Hence, Government needs to plan for establishing new processing units; provide scientific storage facilities and forward linkage in the region to safeguard the interest of Hi-Tech floriculture farmers. Extensive extension services are required to spread awareness about Hi-Tech floriculture unit’s potential throughout the State of Karnataka. Hi-Tech floriculture requires expertise and technical knowhow. However, such guidance is not available to the growers and they depend on foreign agencies and end up paying high service charge

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Name of the investigator : **Snehal Kadadevarmath**

Year of data collection : **2014-15**

Title : **Performance analysis of Hi-tech floriculture units in North Karnataka**

Interview schedule

1. Details of farm family:

1. Name of the farmer:

Age:

Village:

Taluk:

District:

Education level of the farmer

- Illiterate
- Read only
- Primary school(1-4)
- Middle school(5-7)
- High school(8-10)
- Pre-university
- Graduate and post graduate

2) Family size: Joint/ Nuclear

	No.	**Working on farm**	**Off farm**
Male			
Female			
Children			

3. Main occupation:

Subsidiary occupation:

4) a**) Land holding**: Total land holding:

Type of land	Owned	Leased in	Leased out	Total
1) Dry				
2) Irrigated				
3) Seasonal				

b) **Sources of irrigation**

Sources	Area Irrigated (area)
a) Well	
b) Bore well	
c) Canal	
d) Tank	
e) Others if any	

5. Implements and machinery

Name of implement	No.	When purchased		Present value (Rs.)	Repairing Charges (Rs.)
		year	Value (Rs.)		
1.Tractor 2.Plough(Iron) 3.Plough(wooden) 4.Seed drill 5.Harrow 6.Hoe 7.Bullock cart 8.Sprayer 9.Duster 10.Thresher 11.Others					

6. Area under Hi-tech Cultivation Technology

a. Area:…….ha
b. Crop under hi-tech cultivation…….. ha
c. Purpose of hi-tech cultivation: flower/ nursery
d. Experience in hi-tech cultivation :…….years

7. Establishment cost Hi-tech floriculture unit

Year of establishment:
Life of structure:-

Sr. No	Operations	Units/quantity	value	Source/ institution	
A.	**Buildings and other fixed assets**				
	a. land				
	b. greenhouse structure				
	i) naturally ventilated				
	ii) environmental controlled				
	c. material				
	i) polythene sheets				
	ii) shade net				
	iii) others				
	c. cold storage structures				
	d. packaging and grading structure				
	e. office buildings				
B.	f. cold storage equipment's				
	Equipments				
	a. sprayers				
	b. fertigation unit				
	c. borewells				
	d. trolleys				
C.	e. grading equipments				
	Others				
	a. generators				
	b. fence				
	c. electrical installation				
	d. poles				
	f. wires				

D	**Hi-tech cultivation** **Variable cost(crop/year)** 1.plant materials a)Yearly b) quarterly c)Annually 2.mannure i) ii) 3.fertilizer N: K: P: Micronutrients: 4.ppc i) ii) 5.cocopeats/ stands/pots				
E	**Transportation vehicles** a)Tractor b)Power tillers c)Refrigerated vehicles d) others				

8) Labour requirements

sl. no	Operations	frq	Human labour				Machine labour	
			family		hierd			
			M	F	M	F	OWN	HIER
1	Marking lines and measurement							
2	Bed preparation							
3	Pot filling							
4	Planting							
5	Irrigation							
6	Weeding							
7	Reporting							
8	PPC application							
9	Fertilizers application							
10	Harvesting							
11	Others							

M: Male F: Female

9. Details of the Laborers

Sl.no	Male	Female	Permanent laborers		Laborers on daily wages	
			M	F	M	F

10. Details of produce harvested

Sl.no	Name of the crop	Area	Variety	Date of planting	Date of harvesting

Sl. no.	Variety	Month	No of picking	Quantity of Flower harvested	Pattern of disposed				Total
					Home Cons.	gift	wastage	Quantity sold	
		Jan Feb March April May June July Aug Sept Oct Nov Dec							
		Total							

V) Marketing of flowers

a) Particulars of sales by Hi-tech floriculture growers through marketing channels

Sl.no	Name of the crop	Direct sale to retailers	Agencies to whom sold		Frequency of sale	Total quantity sold	Sale price (₹)
			Local /domestic	International			

b) Details of marketing cost

Sl.no	Cleaning /grading cost	Handling cost	Transportation cost	Commission charges	Packing cost	Packaging cost	Others

C) Grading and Standardization

Whether the produce was graded? Yes/No?

If yes:-

1) The basis of grading:
   a) Physical
   b) Chemical
   c) International
   d) National
2) Number of grades:
3) Whether it was done at the market/farm?
4) Labour cost.

Details of packing (for sale in the market)

a) Method of packaging: (Polythene sheets/ Basket/Box)

b) Standard Capacity of the pack

c) Number of packs required for packing the produce

d) The cost of packing material

e) Labors required for packing

e) Who bears the cost of packing material?

VI) Production problems encountered by Hi-tech floriculturist

S No	Problems	Ranks
1.	High incidence of pest and diseases	
2.	High rate of plant protection measures	
3.	Non-availability of pesticides and insecticides	
4.	Non-availability of skilled labor	
5.	High wage rate	
6.	High cost of planting material	
7.	Lack of credit facility	
8.	Lack of technical guidance	
9.	High cost of maintenance	

VII) Marketing problems faced by farmers.

S No	Particulars	Ranks
1.	High packaging cost	
2.	Lack of regulated market facility	
3.	Lack of storage facility	
4.	No incentives from government	
5.	Problems in transportation	
6.	Lack of market information	
7.	Lack of grading and standardization information	
8.	Low demand in local market	
9.	High commission charges	