In any dissertation, review of related studies forms an integral part. When research article and books on related subjects are reviewed the investigator is able to widen the frontiers of his knowledge on the various dimensions of his research problem which have already been subjected to trail blazing researches during bygone years. It is from the review of related studies that the investigator is able to evolve concepts and a theoretical framework for his entire work. Embodied in this chapter are reviews of certain research articles gleaned from reputed books and journals on floriculture.

3.1 Floriculture as a Means of Crop Diversification

According to Hazra\(^1\) Horticulture Crops provide a remunerative means for diversification of land use for improving productivity. He strongly believed that horticulture crops will not only provide nutritional security for

the land used but will also bring a lot of employment opportunities for the rural population. His expectation proved that horticulture can earn 20 to 30 times more foreign exchange per unit area than cereals due to higher yields and higher prices available. His studies have further shown that cultivating horticultural crops can generate much larger employment of the order of 860 – 2500 man days as against 143 man days for cereal crops. Going still further on this point, he has pointed out that horticulture development has gradually moved out of their rural confines into urban areas and from traditional agriculture enterprise to the corporate sector. This trend according to him has led to the adoption of improved technology, greater commercialization and professionalism in the management of production and marketing. He closes his analysis with the positive affirmation that cultivation of horticultural crops would go a long way in adding to the glamour of agricultural practices.

According to Revathy\(^2\) as a result of efforts being made by the Haryana government to encourage crop diversification, the area under horticulture has increased in the state. The farmers are taking keen interest in replacing traditional crops by commercial crops like flowers and spices.

According to Rama Krishnan\(^3\) the farmers of Budigoppa of Belgaum district, Karnataka have shifted to floriculture from the traditional crops such as Jowar, Maize, and ground nut cultivation. Many small and

\(^3\) Rama Krishnan, G., “Flourishing” The Hindu, January 23.01.2008.
marginal farmers have embraced floriculture for the simple reason that it is more remunerative than some of the other traditional crops. Their annual income from the gardens has now gone up from Rs.20,000/- to Rs.80,000 due to frequent hike in flower prices.

Thimmappa and Mahesh\textsuperscript{4} in their work “Conservation Farming as an Alternative to Shifting Cultivation in Meghalaya – An Economic Evaluation” among the different farming systems have found out that the horticultural farming can assure any one the maximum annual net return of Rs.40,115/- per hectare, closely followed by livestock based farming system with Rs.35,421/- per hectare.

3.2 The Flower Industry and its Economic Significance

According to Mishra\textsuperscript{5} among the horticultural crops covering fruits, vegetables spices, medicinal and aromatic plants and the like, floriculture constitutes an important segment. It is the only horticultural commodity which is being grown to improve the aesthetic value rather than culinary purpose. Strictly speaking it is one of the fastest growing industries with huge potential for generating employment opportunities. In effect, its national importance is always on the increase, because flowers are associated


\textsuperscript{5} Mishra, P.K., “Centre Committed to Holistic Floriculture Growth”, \textit{Floriculture Today}, Vol.12, No.5, October 2007, pp.22-23.
with the social-cultural and religious lives of the people, since time immemorial.

In recent years floriculture has become a commercial activity due to its capacity to provide high returns per unit area. Today, with the rapid development of the floriculture industry, there has been a sea change in the use of floriculture items in all walks of life. Most of the public institutions have started using flowers in their offices. This is apart from its traditional usages at weddings, religious ceremonies and cultural functions thus making it a blooming sector.

He adds that in view of its vast potential (of floriculture) of generating income and employment opportunities promoting greater investment of women and enhancement of export earnings, it has been identified by the Government of India as an important segment for development under the ongoing Centrally Sponsored Schemes on horticulture.

3.3 Production and Productivity of Floriculture

According to Kehar Singh et al., Damask Rose plantations are highly profitable. They need to be developed along scientific lines to stand the test of time.

This idea has been upheld by P. Sundar. According to him the

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area under horticulture in Bangalore rural and urban districts has been increased to 5000 acres by the Government. Internationally reputed varieties of flowers are produced mostly for export purposes in the sprawling floricultural farms. Efforts are on to try the cloning technique to produce a totally new generation of flowers.

Kaul in his study on production and marketing of flowers has expressed grave concern over the 20 to 30 percent loss annually registered by the floriculture sector due to lack of adequate infrastructure needed to preserve flowers once demand picks up and the markets become buoyant.

Agarwal and Duhijod in their study try to explain how marigold, chrysanthemum and daisy have been produced more than that of gallardia, wheat, soyabean and irrigated cotton. Marigold generates opportunities of gainful employment for the rural womenfolk who are good at flower harvesting. Human labour costs account for 75 per cent of total input cost in marigold as compared to 45 per cent and 41 percent in chrysanthemum and daisy respectively. Irrigation cost as a percentage of total input cost was also higher in daisy (40 percent) as compared to marigold and chrysanthemum. Daisy flower yields the same benefit as chrysanthemum but

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the per kg cost is very low in daisy due to more physical productivity as compared to chrysanthemum.

Krishnaiah\textsuperscript{10} in his study “Horticulture in Andhra Pradesh Production and Export Potentials” concludes that among the different regions of Andhra Pradesh coastal Andhra has high potential and ranks first in the production of fruits, flowers, and vegetables and he recommends that awareness should be created for horticulture and about its profitability vis-à-vis other crops.

Prem. S. Dahiya et al.,\textsuperscript{11} in their study on “Horticultural Development in Himachal Pradesh” conclude that the prospects for development of crops such as fruits, floriculture, mushrooms are very bright since the state has several innate agro-climatic advantages.

3.4 Studies Related to Cost and Return

When a farmer undertakes an act of agricultural production he has to pay prices for factors or inputs which he employs for production. The prices of the factors are termed as cost of production. Several studies have been undertaken to explain the cost of production of flowers.

According to Nair\textsuperscript{12} the cost of cultivation has gone up substantially to around Rs. 60 lakh per acre from Rs. 35 lakh per acre three

\textsuperscript{12} Nair, G.K., “Anthurium Prices Set to Rise 20% on Short Supply”, Business Line, 14.08.2007.
years ago. Nair holds that it could be attributed to the price of the planting material covering 75 per cent of the total project cost and inflationary trends prevailing in the country. In spite of the unavoidable price hikes, flower producers are making fabulous profits.

Aaditya Mattoo\textsuperscript{13} in his study on “From competition at Home to competition Abroad”, maintains that India’s international transportation costs were 20-23 per cent higher than those in other competing countries. For instance, it costs $790 to transport one metric ton of grapes from India to Netherlands, about two-three times higher than doing the same from Chile.

According to Anil Urs\textsuperscript{14} during Valentine Day celebrations, along with the bulk order, Tanflora was able to fetch a better price of Rs. 20 a stem compared with the previous year’s Rs.16-Rs.18. Normally red roses grown in the country fetch Rs.15-Rs.18 a stem in the European Markets during the season, but owing to bulk supply, our price realization was higher this year.

Manjunath Reddy\textsuperscript{15} says that Indian growers are battling a steep hike in freight costs, which have increased 300 per cent in three years. Freight costs which account for over 50 per cent of the floriculture earnings from Ethiopia Europe are lesser by 50 - 60 per cent compared to the costs from

\textsuperscript{13} Aaditya Mattoo, “From Competition at Home to Competing Abroad: A Case Study of India’s Horticulture”, Financial Express, 17.04.2007.
\textsuperscript{14} Anil Urs, “Tanflora Exports 1 mn cut Roses to Europe”, Business Standard, 07.03.2007.
\textsuperscript{15} Manjunath Reddy “Relocating Some Green House Assets from India to Ethiopia”, Business Line, 04.01.2006.
India. Therefore Indian growers expect to reap the low freight cost advantage by operating from Ethiopia.

Desai\textsuperscript{16} in his study on the production of roses has pointed out in no uncertain terms that the costs of production of cut roses are bound to go up in view of the frightful volatility about the fixed cost which form 36.51 percent of the total cost and the variable cost which forms the remaining 63.49 percent. The cost of production of roses remain volatile in India because the prices of most of its basic inputs have not been under anybody’s control.

Thomas and Gupta\textsuperscript{17} have explained that the main items of expenditure in working out the cost of cultivation of banana per hectare in Kottayam district of Kerala were the expenditure on manures and fertilizers and on labour. An encouraging point noted in their study is the significant contribution of family labour which absorbs about 30 percent of the total labour cost in small size holdings.

According to Selvaraj\textsuperscript{18} in the floriculture smaller farmers have lower overheads. For a smaller farmer production costs per flower are about Re. 0.80 while it is as high as Rs. 2.10 for larger farmers.

Kehar Singh\textsuperscript{19} in his study “Economics of wild Marigold Production and Distillation in Himachal Pradesh” concluded that the

\textsuperscript{18} Selvaraj, K.N., “Horticultural Production in the Free Trade Regime”, \textit{Productivity}, Vol.44, No.1, April-June 2003, pp.115-119.
production of wild marigold is more profitable than other crops like maize, pulses, wheat and oil seeds. Further more he recommend it may be grown economically in culturally wastelands, pastures and forests.

Kalirajan et al.,\textsuperscript{20} in their study “Sources of Output Growth in Indian Agriculture” found that the cultivations of horticultural crops like fruits, flowers and vegetables is much more profitable and labour intensive than the field crops.

Kazi et al.,\textsuperscript{21} in their study “Techno-Organization characteristics of Floriculture in West Bengal” found that the input-output ratios for the crops showed that flowers have an advantage over traditional crops like paddy and potato. High cost of inputs and low prices of output were the major constraints.

Pawan Dahiya et al.,\textsuperscript{22} in their study “Comparative Economics of Floriculture in sonepat District of Haryana” revealed that under the present production technology and relative price structure, marigold was found to be considerably more profitable (net return Rs. 20,295 / ha) over its competing crops i.e paddy (Rs. 9,827/ha) and arhar (Rs. 3,380 / ha) similarly gladiolus was also found to be highly profitable (net return Rs 78,808 / ha) over its competing crops (1.c) mustard (Rs. 3,958 / ha) and wheat (Rs. 1372 / ha).

\textsuperscript{20} Kalirajan, K.P., and et al., “Sources of output Growth in Indian Agriculture”, \textit{Indian Journal of Agricultural Economics}, Vol.52, No.4, October-December 1997, pp.689-692.


Bal and Bal\(^{23}\) in their study on “Flower Power in Punjab” says that flower cultivation is a highly profitable enterprise as compared to other food and cash crops. Favorable climatic conditions, low labour costs, availability of land for floriculture, import of technology are some of the strengths of Punjab floriculture”.

Alagumani et al.,\(^{24}\) in their study found that for all flower crops net present worth was positive and the benefit cost ratio was more than one, indicating that capital investment on floriculture is more paying. Among the four flower crops considered net present worth for Kakaratan was found to be the highest, followed by rose. The benefit - cost ratio was the highest for crossandra (6.00) followed by kakaratan (5.5). Based in the above findings he concluded that floriculture is highly profitable than field crops

**3.5 Floriculture and Infrastructure Development**

According to Nikhil\(^{25}\) poor infrastructure facilities such as storage, transportation and lack of marketing initiative are hampering horticultural growth in India. Due to inefficiency in the supply chain, the price received by the farmers varied from about 24-58% from the price that the consumer paid are infrastructure gaps prevailing in the markets.

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Soumitra Trivedi\textsuperscript{26} found that the exporters of potpori and dried flowers in Surat and Navasari district of Gujarat are witnessing good growth in business. However the lack of good infrastructure facilities is a big hindrance. Farmers and exporters feel that more pack-house facilities will improve business.

In the opinion of Bhagyashree Patil\textsuperscript{27} the infrastructure development is not sufficient enough to meet international demand and compete with other nations like Kenya and Ethiopia. Though farmers produce good quality products, we want proper infrastructure and government support for development.

According to Megha Borse\textsuperscript{28} the basic infrastructure like road, electricity and water, transport, backward linkage and also marketing support from government are necessary to develop domestic and export market of flowers in India.

Bhinu\textsuperscript{29} in his study, “Flori Potency” says that the controlled cultivation of flowers requires the infrastructures like the employment of improved planting materials, green houses, technical know how, infrastructure for the essential cold chain comprising of pre cooling and storage facilities

\footnotesize{\textsuperscript{26} Soumitra Trivedi, “High European Demand Spurs Flower Exports”, Business Standard, 22.08.2007.\
\textsuperscript{27} Bhagyashree Patil, “Industry Must Take Proper Steps to get Organized”, Floriculture Today, Vol.12, No.4, September 2007, p.21.\
\textsuperscript{28} Megha Borse, “Prepare a Road Map of Indian Floriculture”, Floriculture Today, Vol.12, No.4, September 2007, p.13.\
\textsuperscript{29} Bhinu, V.S., “Flori-Potency”, Kisan World, Vol.23, No.9, September 1996, pp.35-36.}
near the field, reefer vans for the transportation and cold storage facilities at the airports.

Ajay Kumar\textsuperscript{30} concludes in his analysis “Floriculture Industry an over view” that many of floriculture units suffered due to lack of infrastructure facilities like cold chain, lack of Technical know-how and elite planting material and many of them are closed. And he suggests that an up-to-date information is required as to which are the companies surviving and which are the ones closed.

3.6 The Growth of the Floriculture Sector

Mishra\textsuperscript{31} in his article “Improve productivity and Quality” says that Floriculture industry has been experiencing rapid growth, world over, with the increasing demand for floriculture items, which need to be capitalized for the benefit of the farming community.

His studies further show that on account of various policy interventions of the Government of India, like liberalization of seed Act 1988 and focused attention given to the floriculture sector by the Ministry of Agriculture as well as Ministry of Commerce, the production of flowers has increased in the traditional as well as non-traditional areas. Domestic Market, both for cut and loose flowers, has increased significantly due to rapid


urbanization, changes in social attitudes increase in income level and with the increasing demand for the use of flowers as gift and bouquets.

According to Surinder Sud\textsuperscript{32} the agriculture ministry proposes to raise the annual growth rate in horticultural output to 5 per cent in the 11\textsuperscript{th} plan from around 4 per cent achieved by this sector since 1991. This will require almost doubling of horticultural production of 2012 which is the target fixed for the National Horticulture Mission (NHM). This year’s budget has set apart Rs. 10.15 billion (Rs. 1,150 crore) under the Central plan out lay for the NHM to invest on modernization of this sector.

Gurusharar Singh Kainth\textsuperscript{33} in his work “Export Potential of Indian Floriculture Products” says that India has a good potential for entering global trade as certain flowers and plants are grown in climates peculiar to India. Hence the Government has identified floriculture as a high-focus export sector. Several industries either on their own or in collaboration with multinational companies have shown keen interest in the production of flowers.

According to Pawar\textsuperscript{34} the agro-climatic conditions of India permit the cultivation of a variety of flowers India is already known for its traditional flower cultivation. Now with the introduction of the centrally

\textsuperscript{32} Surinder Sud, “Planning for Plenty”, Business Standard, 09.05.2007.
\textsuperscript{34} Pawar, S., “Centre Committed to Holistic Floriculture Growth”, Floriculture Today, Vol.12, No.5, October 2007, pp.22-23.
sponsored horticulture schemes, commercial cultivation of cut flowers such as roses, orchids, gladiolus, carnation, anthurium, gerbera and lilies, under protected cultivation has become popular.

Further he adds that during 2006-07 India produced 0.83 million metric tones of loose flower and 2740 million cut flowers, from an area of 0.13 million hectares. Most of the area under open field conditions and about 500 hectares has come under protected cultivation. This is expected to increase further in the coming years. It is learnt that the cut flower cultivation under controlled environment is increasing throughout the world at the rate of 6 to 7 percent per annum.

Singh and Sarbjit Dhalival\textsuperscript{35} in their study “Export Prospects for Agricultural commodities in the New Economic Environment” appreciate that Indian floriculture industry is undergoing an orchid revolution paving the way for a huge amount of foreign exchange earning. Moreover, since floriculture operations are generally labour intensive, we could have substantial advantage in the international trade.

Radha Nagaraj\textsuperscript{36} explains that the Govt of India identified floriculture as a sunrise industry and accorded it 100 percent export oriented status. India has in fact all the favorable conditions like varied agro climatic


profile, floriculture vast land resources, availability of abundant labour and agricultural scientists, for becoming the hub of world floriculture.

According to Sundar\textsuperscript{37} climate-wise the Nilgiris is best suited for global floriculture business and considering the scope to augment India’s share in the international trade, which is presently negligible, the State Government has drafted an ambitious plan to focus on floriculture development in the Nilgiris and making as a Floriculture District”.

According to Nair\textsuperscript{38} India produces a wide variety of flowers including rose, chrysanthemum, marigold, jasmine, heliconias, and carnations in 1, 15, 921 hectares spread over Tamil Nadu, Karnataka, Haryana, Andhara Pradesh Maharashtra, West Bengal and Gujarat. The total production in 2004-05 touched 6, 54, 837 tonnes which included open air and green house cultivation.

3.7 Potential for Income and Employment Generation in Floriculture Sector

\textsuperscript{39}According to Agro-Economic Research Centre studies floriculture has immense potentials for earning the foreign exchange for the growth of the economy. The report has brought to the light several crucial issues the most important among them is positive of embrical details on


\textsuperscript{38} Nair, G.K., “Climate Can Help Flower Market Bloom Globally”, Business Line, 29.08.2007.

demand pattern market arrivals, prevailing prices and price determining factors such as changing consumer tastes and preference for different varieties of flowers. Moreover export of flowers which has emerged as relatively new enterprise requires a lot of efficient marketing intelligence network. The report closed with fervent plan to the government for expediting the process involved in the introduction of fullfledged system of marketing intelligence network as the pre-requisite for user in a viable floriculture industry.

Nageswara Rao\textsuperscript{40} explained that horticultural crops like fruits vegetables and flower crops have higher employment potential compared to field crops, which is mainly due to spread over of the harvesting period in the case of flowers and vegetables. Land productivity is considerably higher resulting from the high yield performance of horticultural crops.

Further he found that the highest number of man-days employment was observed in the flower crops (i.e.) jasmine and crossandra with 1210 and 913 man-days. Continuous requirement of human labour for picking flowers over a period of three to four months contribute to higher labour use.

Ram\textsuperscript{41} in his study explained that major diversion in crop

\textsuperscript{41} Ram, G.S., “Expanding Agricultural Employment The Strategic Issues”, \textit{Agricultural Situation in India}, Vol.LII, No.5, August 1995, pp.267-272.
production has occurred through more area under oilseeds, fruits, vegetables and flower crops. These are not only high value enterprise but also labour intensive in nature. The studies show that per hectare labour absorption in horticultural crops, fishing and livestock sectors are 3 to 8 times more than that in the crop production of food grains.

3.8 Psychological, Emotional, Behavioral and Environmental Benefits of Flowers

According to Mohammed Mustaq the uses of flowers made a headlines in western countries. According to him University studies, conducted between 2000 and 2005 on flowers and plants, he goes on to find that flowers have immediate and long-term positive effects on emotional reactions, mood, social behaviors and even memory for both males and females. The presence of flowers triggers happy emotions, heightens feelings of life satisfaction and positively affects social behavior far beyond what is normally believed.

To strengthen his contention he has made a reference to a study on the effects that flowers have on senior citizens. It showed benefits including better moods and improved memory, it demonstrated that flowers ease depression, inspire social networking and refresh memory as we age.

By his empirical study on flowers in the workplace, he concluded that worker’s idea generation, creative performance and problem-

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solving skill improve substantially in work place environments that include flowers and plants. His recent study shows the importance flowers play in home ecology. It demonstrated that people feel more compassionate toward others, have less worry and anxiety, and feel less depressed when fresh flowers are present in the home, and those feelings carried over to the individual’s work environment.

He concludes his research study by stating that, as long as flowers and plants make people feel good and research enumerates additional benefits, the industry will do well.

3.9 Role of Floriculture in Controlling Environmental Pollution

According to Chadha et al., instead of going for hi-tech technologies against pollution, the trees flowering plants and other biomass are effectively adopted for the various types of pollutions. Interestingly scientists have found that the sea flora is an important agent against pollution and it helps in overcoming the ozone layer depletion.

Bhattacharjee in his study “Periurban floriculture and quality of life” says that India is a treasure house of beautiful trees. In our urban areas, the trees are the dazzle of nature outside our doorstep. The mature trees will stabilize temperature and save hundreds of crores of rupees per year by reducing cooling cost and non-renewal fuel consumption and also reduce

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carbon dioxide emission. Since the plants absorb gaseous and particulate pollutants, air quality is enriched.

According to Som Dutt\textsuperscript{45} floriculture assumes more significance for its immense contribution to environmental conservation, landscaping, abatement of noise pollution, cleaning of air we breathe and the like. In this way floriculture has increased its value manifold, beyond objects of beauty. This has resulted in greater appreciation for this science of floriculture.

Anoop Kumar et al.,\textsuperscript{46} in their study “Floriculture in Controlling Pollution” say that pollution has become a global concern due to rapid decrease in greeneries. The pollution can be controlled by increasing more oxygen and decreasing carbon dioxide concentration in the atmosphere which is possible by planting more and more trees and flowering plants. Further we can protect the natural resources of forest wealth as an aid to decrease pollution.

3.10 Indian Floriculture and International Floriculture

Nancy Laws,\textsuperscript{47} a floriculture marketing consultant from the US says that India tops in acreage under flower cultivation with over 1.05 lakh hectares but Holland with flower cultivable area of 5,000 hectares, tops in exports followed by Columbia, Ecuador and Kenya India does not figure even

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among the top ten exporting countries. The reason is the farmers in India concentrate on domestic market and not for export.

According to Vijayakumar\textsuperscript{48} the production value of nursery and green house crops was the third largest part of crop agriculture in the United States according to the most recent U.S Census of Agriculture conducted in 2003 surpassed by only corn and soybeans. This agricultural segment is larger than wheat, cotton and tobacco. Of all U.S agriculture production (plant and animal), floriculture (nursery) plus green house crops was the sixth largest agricultural segment, comprising about seven percent of total agriculture sales. He further adds that in 2005, the floriculture production segment alone contributed $5.4 billion in production value.

Jafar Naqvi\textsuperscript{49} in his study “On trail of floral Dragon he says that Chinese floriculture sector started a large scale commercialization from 1984 and by 2003 grew almost 30 times. Flower cultivation and usage of flowers is common all over China, especially for traditional usages and medicinal purposes, however commercial cultivation of flowers for export is about eight years back and is growing at an estimated rate of 20 per cent a year with 82,000 ha under floriculture, the Chinese floriculture is almost 50 billion Yuan. There are over 2500 flower markers currently operating and serving

over 20,000 retail shops and floriculture sector directly supports over four million people involved in production, logistics, marketing and retail.

According to Peter Boerlage\textsuperscript{50} in India in spite of having suitable climate and soil conditions for flower production the area could fail to become a proper production place in want of sound infrastructure like transport and cooling options.

He further add that African flower producing countries (especially Kenya) has developed a strong infrastructure required for floriculture. Also their post harvest product quality is of high level, as they have stability in volume of good quantity flowers. If we compare between Indian and African floriculture. Indian floriculture is more focused on local market because quality level for the local market is not that strict. Indian floriculture lacks behind African by infrastructure, post harvest techniques, stability of volume and good quality flowers all year-round.

According to Kostwinder\textsuperscript{51} the major producers of flowers, Netherland have a long tradition of flower and plant production. Experience know how have been passed on from generation to generation. Many Nurseries are family businesses run by hard working and flexible individuals. Expertise is stimulated by a good system of Horticulture education, extension

\textsuperscript{50} Peter Boerlage, “Indian Floriculture Could Outpace African Floriculture”, Floriculture Today, Vol.12, No.4, September 2007, p.16.

and study groups. New innovations are generated by scientific research. The annual production is estimated at US $ 3 billion or roughly 20% of the total Dutch agricultural production value. Each year, flower producers buy US $ 1.5 billion work of production materials. The country exports about US $ 3.5 billion of cut flower annually. The sector as a whole provides 57,000 full time jobs.

3.11 Research and Training on Floriculture

According to Rahul Wadko\(^{52}\), Flora Expo is providing a platform every year for buyers and sellers to interact and understand latest developments and market trends of the business. The National Horticulture Mission is also subsidizing railway fares for farmer delegation attending the exhibition.

Mohan Murti\(^{53}\) says that to encourage farmers and to make them confident, the government of Haryana has launched several training programmes for horticulture farmers across the state. The farmers are also being paid to get trained at the rate of Rs. 1,500 for seven days training in Haryana and Rs. 2,500 for training outside the state.

According to Baldev S. Chauhan\(^{54}\), a team of officials and farmers led by State Horticulture minister has flown to Amsterdam to attend

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\(^{52}\) Rahul Wadko, “Expo to Show Case Floriculture Potential”, Business Line, 23.03.2006.


\(^{54}\) Baldev S. Chauhan, “HP to Participate in Dutch Horticulture Fair”, Business Standard, 01.11.2006.
the international horticulture fair in Amsterdam. The fair focusing on Floriculture technologies and services, will provide the team a platform to interact with the best in the field from all over the world and help them assess the procedure for export and discuss with manufacturer, cultivators, dealers, packers, exporters and distributors concerned with the floriculture industry.

Arun Kumar\textsuperscript{55} in his report “Departmental Assistance for cultivation of loose at cut flowers” says that in Andhara Pradesh the state government is providing subsidies to the flower growers and in addition to that the selected beneficiaries are also given training in adopting improved technologies in these new crops, assisting in processing better planting material and installation of green house.

3.12 Sustainable Floriculture and Social Responsibility

Sustainable floriculture and social responsibility is one of the most fascinating avenues of research in the modern days in the most of the developed nations. An immense social programmes has been launched time to time by flower growers association. According to Marta Pizano\textsuperscript{56} like programmes for cultivating peace in the Family. Day care centers and the school of floriculture and the like to the workers keenly involved in floricultural operations. They also learn basics of growing flowers for the


purpose of exports as they work in their farms. Further participants are helped to cope with their difficult home situations through counseling programmes and ethics training. Marta Pizano, is optimistic that the school of floriculture if open in every country will pave the way for revolution the process of growth in floriculture industry.

3.13 Small Growers Programme

According to Mohan Pillai\(^{57}\) the small grower’s programme of the rubber department could be trained in the flower industry as well. The programme basic objectives are to upgrade the field practices of the small growers, to advise on correct techniques and the buy back of flowers at very remunerative prices. This programme in Mohan Pillai’s opinion is bound to produce positive impact on the floriculture industry. If it implemented successfully this programme will bring out increase in the yields and very remunerative prices for the small growers, saving of processing costs and infrastructure for the Small Growers problem-free marketing of all the flowers produced without introduction of Middleman. Madhavan Pillai concludes the analysis by holding that the small grower’s programme will benefit immensely to the Small Growers all over the country.

3.14 Modern Technologies in Floriculture

David Gray\(^{58}\) in his article “Environment friendly and

production efficient solar heating” says that the solar heating project first in Africa, and the largest of its kind worldwide. The cheapest energy is solar energy. In Kenya, the temperatures drop dramatically in the early morning as other rose growers have found this can have disastrous results with condensation. The basic principles of the system is that a large reservoir tank holding some 800 m$^3$ of water is connected to a series of steel, aluminium and glass panels. The water is pumped through these panels either slowly or fast according to the ambient temperature and thermostatically controlled.

He concludes that using this system the growers will get increase of 15-20 percent in production and disease control and improved quality.

Marta Pizano$^{59}$ in her studies “Challenges for soil-less production” says that production of cut flowers on raised beds or in containers filled with artificial (soil-less) substrates has increased over the past years, mostly for reasons associated with avoiding soil fumigation. Better quality yields have generally been the reward. Nevertheless converting to substrates is expensive and time consuming and poses new challenges for growers.

According to Anabel Evans$^{60}$ “Sea freight will never be synonymous with day fresh products but perhaps the cut flower sector will refills it because the aspect of post harvest treatment. One particular aspect of


post harvest treatment is cool chain. It is adoptable one in sea freight therefore this alternative to air freight are capacity, availability the lower distribution costs and low CO₂ emissions"

3.15 Leap-Frogging in Technology

Dilip De⁶¹ is a orchid cultivating farmer. He has wide and length of the need for a leap-frogging in floriculture technology according him despite the fact that India has diversified climate, a cheap labour and good farming technology, the orchid industry is not even in an infant stage both in terms of micro-propagation and commercial cultivation. He adds that in India orchid industry to take-off in a big way, research institutes and breeders must develop newer varieties of orchid plants to which will adopt to local growing condition by possibly cross-breeding a native orchid from a particular location with hybrid orchid varieties will flood in Indian farmers very high income, they are also widen the prospects of growth. So Dilip De argues that the leap-frogging in technology is larger hour to step up the growth of floriculture in India in general and production and Marketing of orchid in particular.

3.16 Floral Preservatives

Pathania and Sharma⁶² have made a detailed study on floral preservatives for making the quality better and extending the longevity of

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flowers. In their opinion floral preservatives perform three functions (i) they provide sugar (carbohydrate) (ii) they supply a bactericide to prevent microbial growth and blockage of the water-conductive cells in the stem and (iii) they acidify the solution. The latter function suppresses bacterial development and through some unknown process, prevents wilting of flowers.

They told that various universities and private bodies have developed successful preservatives. The most popular preservatives today contain 8 hydroxyl quinolin citrate (8 HQC) and sucrose (common table sugar)

Carbohydrate supply is best in quality flowers grown under high light intensity conditions and harvested at proper maturity but even these flowers will benefit from additional carbohydrates. It is possible to supply adequate carbohydrates for some flowers by standing them in concentrated sucrose solutions for up to 24 hours immediately after harvest (also known as pulsing).

Pathania and Sharma says that there are several numbers of commercial preservatives in the market including such products as floralife (R), Petalife (R) Oasis (R) Rogard (R), Ever bloom (R), Florifresh, Viva La Fleur and the like. These work well and one can also purchase 8 HQC under the name of oxine citrate from florist supply companies.
They conclude that floral preservatives are very effective in maintaining quality and extending longevity of flower.

### 3.17 Green House Technology and Floriculture

According to Ahmed et al., Greenhouses are framed structures connected with transparent and translucent material in which crops can be grown under controlled environment. A plastic film or fiber glass cover acts like selective radiation filter, which allows solar radiation to pass through it but traps thermal radiation emitted by objects inside it, mid type greenhouses can have cooling and heating arrangements. High type can have auto control mechanisms.

Dharmarajan in his study says that the advantages of growing plants in a greenhouse are 1. It reduces crop damage created by unfavorable weather conditions, modify local climates and improve the productivity and quality of crops 2. Crops can be grown throughout the year 3. Crops give higher yield 4. Labour and water requirements are less.

Shashidhar et al., in their study “Green House cultivation of cut flowers and ornamental plants” says that the basic consideration in establishing flourishing greenhouse operations are (1) Before constructing a greenhouse one must take into consideration the location, climate crops to be

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grown, cost of production and economic returns. (2) The success of
greenhouse production depends on the ability of the grower to use the infra-
structure and production inputs optimally. (3) The plants are living materials
and they need close attention. People who are working in the green house
should have technical knowledge, proper co-ordination between workers and
horticulture mentality.

Dhaliwal in his analysis on “Horticulture, floriculture revolution sprouting” says that the Himachal Pradesh farmers are supported by
Himachal Technology mission, the National Horticulture Board and the state
Horticulture Department for raising of green houses. There are farmers
earning between Rs 5 lakh and Rs 10 lakh from small plots ranging from 400
square yards ton 3000 square yards.

According to Edward Bent innovative green house was started
in the new production of Anthura in the landscape of Bleiswijk. The green
house complex has a surface of 12 ha, plus a 2 ha double-storied floor of total
area provided with the fully automated container system. By means of a
maximum climate control system considerably leaner energy consumption is
realizable. This type of modern green house provides a good growing start for
a micro plants at high humidity and also closed green house system by which
warmth can be obtained.

3.18 Ills of the Floriculture Industry in India

Adnan Younis has expressed great concerns about the growing ills of the floriculture industry in India.

According to him in India floriculture is in the embryonic stage. There are lack of resources and skilled persons to develop the industry up to international standards.

He found that it is the need of the time to produce skilled personnel and explore new means to ensure survival of our farmers and explore marketing to save our economy as well as to increase export.

He takes his analysis still further and says that the value added products from non-conventional floricultural crops like essential oil of rose, tube rose, jasmine, and the like and plants extracts used in medicine and pharmaceutical industry are unique and likely to face less competition in international market after the post WTO scenario and therefore have the potential for export and import substitution.

He further adds that northern areas of the country are very rich with flora and germplasm which is still unexplored. The available natural resources can be exploited commercially. The government can deploy well qualified and well paid horticulturists in this region.

3.19 Major Constraints in Floriculture Industry

Jafar Naqvi\textsuperscript{69} has conducted a detailed study on the problems of floriculture Industry. According to him the problem prevailing is lack of communication between growers and wholesale traders and exporters and the fraudulent practices by wholesale traders operating in national and international market. Another problem which is faced by the farmers are plant material supplies would display the infertility material supply. To make matters evoked importers have been finding it difficult to act with growers done to them most dreaded channels of contact between the growers and importers. The author has expressed they are concerned over the absence of organized marketing channels and monitoring systems and the lack of advertisement for the highly competitive Indian flowers in the every growing horision of international market.

Jafar Naqvi closes the fact-finding studies with the strong recommendation for the prompt introduction of a sound management system which can accelerate the phase of growth of floriculture industry.

O.P. Sehgl et al.,\textsuperscript{70} in their study observed that lack of technical persons, inadequate incentives by the State Government, poor handling of flowers and marketing are the major bottle necks in the carnation industry of Himachal Pradesh.

\textsuperscript{69} Jafar Naqvi, S., “Recommendations and Highlights of 3\textsuperscript{rd} International Flora Expo 2007 Conference”, \textit{Floriculture Today}, Vol.12, No.5, October 2007, pp.38-46.
Venkataratnam in his study “Further Thrust in Horticulture” explains that foreign companies from Holland, Israel, UK, Germany and France ventured into direct collaborations with Indian entrepreneurs who had no experience in this field. Over 100 companies have sprung up in the last five years for export of flowers. As the technologies were not refined to suit Indian conditions Agricultural Universities had no time to embark on industrial research for export of flowers. Many companies have folded up and a few companies also took Indian entrepreneurs for a ride and huge losses were incurred. And he found that lack of appropriate Green house technology, knowledge of liquid fertilizers computerization, want of cold chain, lack of cargo space, adequate air transport facilities and poor infrastructure in air ports and procedural formalities have caused a serious set back to floriculture industry.

Subrahmanyam in his report “Horticulture in India: Organization of Production Marketing and Processing” found that in the market itself the cultivators face the risk in the form of cheating by illegal deductions, overcharging, offering low prices through collusion and under weighing.

Pathnia et al.,\textsuperscript{73} in their study “Floriculture Industry in India” listed the major constraints in floriculture industries are,

1. Poor production both in quantity and quality.
2. Inadequate surplus for export.
3. Lack of specific information like present level of production area and locations of flowers and ornamental plants in the country.
4. Absence of organized marketing channels and monitoring system.
5. The infrastructure for floriculture institutes and agricultural universities is meager.
6. There is acute shortage of qualified and trained staff in floriculture.
7. Non availability of training facilities.
8. Government regulations for export and import are too time consuming and not in favour of export.

Praveen Sharma\textsuperscript{74} in his study “Cut Flower Exporters Cheer Up” says that the main problems being faced by Indian fresh cut flower exporters relates to the transport of flowers.

\textsuperscript{74} Praveen Sharma, “Cut Flower Exporters, Cheer Up”, \textit{Floriculture Today}, Vol.12, No.3, August 2007, pp.10-12.
1. They face a significant transport cost disadvantage in exports due to the cost of airfreight from Indian airports to various international destinations.

2. Indian exporters are unable to get Air freight Discounts due to low export volume resulting in high air freight cost.

3. Frequent Air Freight increase by Airlines.

4. Inadequate freighter flights from India to destinations like European countries and Japan, which are the main destinations for Indian cut flowers.

   According to Mohamad the country’s floriculture exports are likely to stay around Rs.700 crore by end of 2010 against the projected level of Rs.1000 crores as bottlenecks like infrastructure, production technology and availability of basic inputs continue to be unaddressed.

3.20 Problems of Export-oriented Units in Floriculture

   According to Surinder Sud India in acreage of flower production occupies the second position after China. But India’s share in the global flower market is still no more than 1-2 percentages, though the scope for raising it is rather huge. Flowers, being delicate products with very short-shelf-lives, require specialized post-harvest handling, storage and transportation. Cold chains and dedicated transportation and cargo handling

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facilities are therefore needed for both domestic trade and export. Cold store facilities are desirable even at the export destinations to keep losses to a minimum.

Drabu,\textsuperscript{77} Chairman of Jammu and Kashmir Bank said that Banks had largely failed farmers in helping them out with loans and the government had done no better as the industry lacked infrastructure like transport, sale centres and technological know-how. The absence of essential facilities meant that floriculture in the state could never take off despite natural abundance.

According to Sushila Srivastava et al.,\textsuperscript{78} in spite of good scope for export of flower and live plants, India does not have even peripheral presence in the international trade. Inadequate infrastructure for the production of floral crops, lack of appropriate planting materials and improved technology of production and basic inputs such as standard containers growing media and quality packing materials, unavailability of information about the prices in the global market and unorganized domestic market are some of the other major problems for the export of floriculture products.

The Parliamentary standing committee on commerce that tabled its report on floriculture in Rajya Sabha recommends that the government treat it as an agricultural activity and not as an industry. One of the problems faced by export oriented units that the development of infrastructure has not keeping pace with growth in production, the high capital cost of units, the high interest rates on loans, the international market crashed following increased supplies from Africa and other developing countries. The small size of holding resulted in high operational costs.

According to Patiala the country’s floriculture exports are likely to fall short by Rs.300 crore against the projected level of Rs.1000 crore by the end of 2010. This would mainly be because of lack of infrastructure, non availability of good plant material and production technology. Moreover cold storage facilities have not been created in leading airports to handle to such exports efficiently.

Maninder Singh in his study on “Flower Exports May Suffer on Delayed Pay”. Flower exports till January in the financial year 2007 stood at Rs.350 crore, which is 98 percent of the Rs.356 crore fixed for the entire financial year. However, default in payment for last financial year’s exports is likely to adversely affect fresh shipments.

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80 Patiala, S., “Concern over Slow Growth in Floriculture Exports”, Economic Times, 22.08.2007.
Malaisamy and Ravindran\textsuperscript{82} in their study “Problems of Export-oriental Units in Floriculture” said that the credit support from banks is still not adequately flowing into this sector. This is due to banker’s feeling that the project outlay is too high. Only limited appraisal expertise is available in respect of export oriented units of agriculture.

Singh\textsuperscript{83} says that the local growers are not too eager to try the India flower species, which are as good as. Instead they propagate foreign varieties illegally. The growers say that the India flowers lack international acceptability.

3.21 Steps Taken by the Government to Increase Flower Export

Malaisamy et al.,\textsuperscript{84} listed the steps taken by the Government as follows

1. The government is working out a scheme to impart training to farmers and Entrepreneurs.

2. The government is working for an air freight subsidy for export of cut flowers and exemption of export oriented units from requirement of custom bonding.

3. The total quarantine procedures have been simplified and made easy for the expeditious clearance for the import of seeds and planting materials.


4. Import permit for flower seeds and Tissue culture materials of plant origin has been waived.
5. Import duty on floriculture planting material has been reduced from 55 percent to 10 percent seed development machineries 136% to 25%.
6. Floriculture units can avail of the benefit of duty free imports if they export 50 per cent of their produce.

According to Randerson\textsuperscript{85} to give boost to horticulture, the Andhra Pradesh Government announced 100 per cent subsidy to the small and marginal farmers to cultivate horticulture crops up to five acres. Farmer would be, provided wild saplings, fertilizers and ‘paid labour’ charges for drip and sprinkler irrigation systems would be provided to the farmers at 70 per cent subsidy.

Marcus Dam\textsuperscript{86} says that the Haryana Government has announced to boost floriculture the state government was providing a grant of 50 per cent to small and marginal farmers and 33 per cent to other farmers for flower cultivation, similar type of grant was providing to the farmers for setting Green Houses.

According to Venkataratnam\textsuperscript{87} the Government of India liberalized import of capital goods, without duty, encouraged soft loans

\textsuperscript{85} Randerson, J., “100 p.c Subsidy for AP Horticulture Farmers”, The Hindu, 05.05.2007.
\textsuperscript{86} Marcus Dam, “Government Promoting Crop Diversification through Horticulture”, Tribune, 14.05.2007.
through Horticultural Board and some incentives like rebate on airfreight by APEDA.

Praveen Sharma\textsuperscript{88} explains that based on the feedback received from the floriculture industry there is a strong case for developing a crop insurance scheme specifically targeted at the risk of crop failures and poor productivity depending on the weather conditions like continuous rainfall, excessive rise or fall in temperature and susceptibility to attacks by pests. The insurance scheme will be initially offered by a nationalized insurance company with support from the government.

According to Jafferson\textsuperscript{89} National Horticulture board, the state government and APEDA in the form of subsidy coupled with the technical support offered by United Plantation of South India, already Rs.2.24 crore has been released as subsidy to the farmers. Tamil Nadu horticulture department proposed to set up two ultra modern nurseries for production and supply of planting materials at a cost of Rs.4 crore and also Post-harvest management centers would be established very soon for grading, sorting, bunching, and cold storage refrigerated transport on an investment of 4.39 crore.

According to Sharma\textsuperscript{90} the state government of Himachal Pradesh was providing insurance to horticulturist farmers under the National

\textsuperscript{90} Sharma, K., “Himachal Pradesh Providing Subsidy to Horticulturists”, Business Line, 05.01.2006.
Crop Insurance scheme and also providing subsidy on agriculture equipments and fertilizers.

According to Kuldeep Chauhan\(^9\) Horticulture the farmers can take loans from the banks to set up the polyhouse, green houses and other small projects, once these are set up farmers get subsides up to 50 per cent under Horticultural Technological Mission (HTM).

According to Ashok B. Sharma\(^2\) the government has distributed resources for creating poly greenhouses with minor irrigation systems to interested entrepreneurs all over the valley, either free or at 50 per cent subsidy rates. The scheme, under the centrally sponsored Technology Mission, was available in every district in Kashmir valley.

Geeta Nair\(^3\) in her article “Flower Power Blossoms in Maharashtra” says that Maharastra has identified floriculture industry as a sunrise industry and agri export zones (AEZs) for flowers have been approved in Pune, Nasik, Kolhapur, and Sangli. The Talegaon floriculture Park has come up in Pune is a symbol of the resurgence of floriculture with roses, gerbera and carnations.

She also adds that State Bank of India has started funding these projects and processed 14 proposals and sanctioned Rs.4.1 crore. As the park

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\(^3\) Geeta Nair, “Flower Power Blossoms in Maharashtra”, Financial Express, 15.01.2007.
is under AEZ, the SBI is able to provide finance at a concessionary rate of interest of 8 per cent.

3.22 Fortune of Floriculture

Floriculture is more profitable than any other kind of agriculture. Radha Krishnan\textsuperscript{94} has done an extensive study of fortune of floriculture. In his opinion, in India there are centres where international reputed varieties of flowers are produced. Agri-Export zones are formed, these export zones having brought within the ambit of National Horticulture Mission. Nilgiris the place of prominence in Radhakrishnan studies, his statistics have brought light that cut flowers have been grown on about 43 hectares in Nilgiris. A total of 551.85 lakh stems have been accounted by this area. Stating that carnations alone accounted for about 384 lakh stems, he has rightly pointed out that carnations grown here had earned the reputation of being the best in the country. He goes on to add that quality wise they were now on a par with those grown in Columbia. In an effort to illuminate this point he has added that cut flowers like lilium, alstroemeria, gerbera, bird of paradise, chrysanthemum and anthurium grown in Nilgiris is likely to increase in quality in the years ahead. He is very optimistic that places like Coonoor and Kotagiri which are close by areas could be developed as agri-export zone. Thus in his opinion floriculture is emerging as a blooming business in India.

\textsuperscript{94} Radhakrishnan, D., “Young Farmers Take to Floriculture”, \textit{The Hindu}, 07.08.2007.
He is optimistic that floriculture which denotes cultivation of flowers developing the new varieties of commercial value, sale of flowers as raw commodities, processing, distribution and the like for the local and international market, will certainly bring immense fortune for enterprising farmers.

3.23 Strategies for Boosting Floriculture

Shashi Kolavalli et al.,\textsuperscript{95} in their report on “Floriculture Industry in India” says that we need better varieties and timely and adequate supply of planting material, expansion of production under controlled environment with appropriate technology, infrastructure for post-harvest care and transport and centralized collective market development for the benefit of small growers.

Dilip De\textsuperscript{96} in his study observes that lending rates are high in India. They range between 11.5 percent and 15 percent. However, it is around 6 percent in Holland. Agricultural banks in Holland lend money to NABARD at 2 per cent where as local grower is made to pay over 15 per cent interest. To promote floriculture and give a boost ministry of finance should set a ceiling on interest at 6 per cent.

Kajaria\textsuperscript{97} feels that more and more industry interaction is very essential for the survival of the industry. Apprehension about interaction has to be done away with. Many floriculture units fear that if they join together on a common platform, their secrets will be known to the competitors. They do not also allow their staff to interact with others on the fear that competing unit will steal them away by giving better emoluments. They also fear that their technology will be revealed. This is wrong medieval concept. The staff should be given freedom to interact and they should be given technical and management training.

Sindhu and Mishra\textsuperscript{98} explain that support price for floricultural crops should be decided by the government. At least two full-fledged institutes to strengthen the research back up. Some incentive in basic facilities, marketing, cargo space and cool chain must be given to the growers.

According Malaisamy et al.,\textsuperscript{99} the government should tackle the very important issues of duty charged for Indian flowers i.e, 12 per cent during season and 17 per cent during off season, which is not imposed on other countries like Sri Lanka and African countries.

Pathak et al.,\textsuperscript{100} listed their recommendations are

1. If needed plant material should be imported for developing export trade.

2. The cultivation technology should reach the grass root level through extension workers.

3. The marketing procedure of floricultural produce should be channeled.

Jafar Naqvi\textsuperscript{101} recommended that

1. In order to increase the volume, production areas will have to be expanded and new growers motivated and trained to take up floriculture as an enterprise.

2. There is an urgent need for setting standard and Good Agriculture Practices related to quality, environment and welfare.

3. Domestic market infrastructure like Flower wholesale markets, Auction centers needs to be given urgent attention.

4. Universities and National Institutes need to share the technology developed to extension agencies, media financial institutions for popularization.

5. Growers should try to be technology savvy and follow strategies that competitors are already using. Farmers should make maximum use of Information Technology boom in India.

According to Vishwanath Kulkarni\textsuperscript{102} setting up of export promotion council, establishment of appropriate marketing and distribution

\textsuperscript{101} Jafar Naqvi, S., “Recommendation and Highlights”, \textit{Floriculture Today}, Vol.12, No.5, October 2007, pp.38-44.

\textsuperscript{102} Vishwanath Kulkarni, “Concern Over Slow Growth in Floriculture Export”, \textit{Economic Times}, 22.08.2007.
channels, abolition of import duty on inputs and reduction in existing air freight tariff structure should be taken up by the government.

Pawar\textsuperscript{103} explains that the developed countries particularly Europe, North and South America, Australia Japan and Singapore climatic conditions do not favour round the year for the cultivation of cut flowers and many of them import flowers from other countries. India could capitalize on this situation by adopting scientific technologies for improving the productivity and quality.

3.24 Government Initiation Needed on Floriculture Industry

Government initiation is always needed for the rapid growth of floriculture. Adnan Younis\textsuperscript{104} has dwelled at length on the need for certain government initiatives to step up the growth of the floriculture industry of India.

According to him, the marketing system is to blame for the problems in the floriculture industry. He has explained how certain flower merchants generally buy flowers and distribute them to local retail outlets after a significant mark-up. The retail florist shops usually operate on roadsides with little or no protection for flowers. As Adnan Younis has rightly pointed out government should invest in setting up auction centre as


\textsuperscript{104} Adnan Younis, “Issues, Challenges and Opportunities in Floriculture”, Floriculture Today, Vol.12, No.1, June 2007, pp.34-35.
well as organize floral shops with storage facilities to prolong the vase life of flowers. He adds that the government should reduce import duty on planting material and equipment, bring down air freight to a reasonable level, provide sufficient cargo space in airlines, establish model nurseries for supplying genuine planting material, establish cooperative florist organization at regional level, set up training centres, provide cold chain from farm to destination and should adhere phytosanitary conditions and the WTO laws.

The books and research monographs hitherto reviewed have brought to limelight numerous interesting aspects of the floriculture industry, which have remained obscure during the last few decades. The investigator is quite optimistic that this study will go a long way in bringing about a revolutionary change in the floriculture industry of India in the years ahead.