Introduction
I. INTRODUCTION

The flowers are the options to express the feelings rather than words. Flowers are among the loveliest objects on the earth and floriculture has emerged as a major diversified substitute for agri-business in recent years. Many kinds of flowers are grown for domestic and foreign trade in developed and developing countries. Floriculture is considered as an emerging field with high earnings.

Flowers symbolize purity, beauty, peace, love and passion. Beside beauty and aesthetic values, flowers have always been a part of the Indian culture, primarily for religious offering and floral decorations during festivals and weddings. Floriculture is most profitable among agri-businesses because, it is an intensive type of agriculture and the income per unit area from floriculture is much higher than any branch of agriculture. Therefore, this sector of agriculture can be a potential money-spinner for developing countries like India.

Among the flowers, the rose (Rosa species L.) has captured the hearts of all. As Hynes has said “Ever since man first beheld it and inhaled its scent”, the rose has captured his imagination and taken root in his thoughts (Pal, 1991). The rose flower gives an array of shape, size, fragrance and color. The rose has continued to play an important role in almost perfection and therefore, Sappto, the Greek poetess named it as the “Queen of flowers” in 600 B.C. It is regarded as the symbol of life, love, devotion, beauty and eternity. Rose (Rosa indica) belongs to family Rosaceae. The position of rose is such that no garden or flower market is complete without its presence. No other flower is better symbol of love, adoration, innocence and other virtues than the rose. For showing respect to rose, it is cultivated throughout the world in large number.
Roses are cultivated in India since ancient times, being referred to it in old Sanskrit word as “Turan Pushpa, Atimanjula, Semantika”.

During last three decades the interest in growing roses has developed in India, because of its economic and aesthetic value. In India, it is cultivated commercially for cut flowers. Petals are used in traditional markets for making garlands, for offering in the temples, while the florist shop sell cut roses with stem, mainly for bouquets, interior decoration, religious and social functions and floral arrangements. Besides this, roses are being cultivated for attar and other products. Rose petals are used for making candy, wine, gulkand, gulabjal (rose water), rose oil, rose perfume etc.

Floriculture is increasingly regarded as a viable diversification from the traditional field crops due to increased returns per unit and the increasing habit of “saying it with flowers” during all occasions. With the advent of Government of India’s liberalization policies and floriculture development initiatives, several corporate houses have entered to set up 100 per cent export oriented units, since the implementation of the new policies during 1991. These 100 per cent export oriented units are supported with technology and marketing tie up with the collaborators from Netherland and Israel. These were setup in and around Bangalore, Pune, Hyderabad and Delhi, mainly for rose, carnation and anthurium. The area under environment controlled greenhouse is estimated to be around 500 ha. Of this, many have received very encouraging results in terms of acceptance of the quality in the major international markets.

In International floriculture trade, India ranks 23rd in flower export. In India, area under floriculture is estimated at nearly 1,83,000 (Bijay,2010 ). The total production of flowers in India is 10,21,000 MT of loose flowers and 6667 millions of cut flowers. The total export value of flowers in 2010-11 in India is 28,645.42 lakhs (Anon, 2010). Among the
flowers, rose alone contributes 51 per cent share in the world flower trade. Area under rose cultivation in India is more than 6000 ha. Maharashtra is a leading state in rose production. In spite of long tradition of agriculture and floriculture, India’s share in the International market for cut flowers is hardly 0.04 per cent of global trade. The most important cut flower traded in the market is rose.

Ornamental plant production can be successful and economical only if the finished products excel both in quality and quantity. They will also have to be produced regularly, so that they will be available throughout the year in the domestic and export markets. In order to ensure consistency in quality and quantity of production and to limit the environmental risk involved, it is necessary to grow these plants in a controlled environment like that of greenhouse. Low cost greenhouse could be effectively utilized for commercial cultivation of cut flowers viz. rose, gerbera, carnation and anthurium to obtain higher productivity and quality cut flowers.

Polyhouse is a framed structure covered with transparent polyethylene films, large enough to grow crops under partial or fully controlled environmental conditions to obtain optimum growth and quality production. The main advantages of polyhouse cultivation are, the crops can be cultivated successfully throughout the year, getting high productivity with excellent quality, moreover it is easy to protect the crops against extreme climatic conditions and incidence of pests and diseases, thus the genetic potentiality of the crops can be exploited to the maximum extent.

A typical naturally ventilated structure called as polyhouse contains a mesh covered top ventilator for escape of hot air. Besides, top ventilator, such polyhouse also have mesh covered side ventilators on both the sides with an option to cover by rolling a layer of polythene
cladding material. Occasional rise in temperature for a few days in summer can be easily managed by operating both the ventilation systems. Besides operating the crop level misters, foggers or micro sprinklers, high temperatures in a polyhouse in hot season can also be minimized by applying a layer of lime on the top of polyhouse.

Among the various factors responsible for high crop yield, supply of appropriate quantity of nutrients at appropriate time, plays a vital role in enhancing the productivity and quality. Nutrients are normally applied as a basal dose and top dressing the nutrients applied in the form of fertilizers are subjected to leaching, fixation and losses in the soil. Further, the nutrients traverse deeper to areas beyond the active root zone and become unavailable to the plant. In many cases, the effective utilization of nutrients by the plant is less than fifty per cent of the fertilizers applied.

Drip irrigation is the most efficient method of irrigation for horticultural crops especially greenhouse grown crops like cut flowers, vegetables etc., offers an opportunity for precise application of nutrients in the form of water soluble fertilizers to the soil at the appropriate time at the desired concentration. This practice of application of water soluble fertilizers through irrigation water is termed as fertigation. Drip can efficiently place the nutrients in regions of high root concentration. The biggest advantage of fertigation is that the required nutrients can be applied uniformly to each and every plant even on daily basis, thereby creating an ideal and optimum environment for the plants to absorb the required nutrients. Since, the required nutrients are made available uniformly, through frequent application, the wastage is drastically reduced. As a result fertigation improves the crop yield substantially.

Although, breeders have developed several rose cultivars having desirable characters, but all the characters could not be incorporated
into a single variety. Hence, there is a great need to improve the quality of rose flowers to emulate the flowers of international standard. There are various ways by which quality of flowers can be improved and use of growth regulators have played a vital role in retarding the senescence, improving the quality and prolonging the vase life of flowers (Bhattacharjee and Bose, 1978; Gowda, 1985; Singh and Bhattacharjee, 1998).

Fertigation combined with several growth regulators have been used in rose for getting the desirable characters such as optimum stem length, stem strength, bud initiation, bud development and flower diameter etc. However, no clear results have been obtained in rose research, especially for Dutch varieties. Hence, “Effect of different levels of fertigation and growth regulators on growth, yield and quality of rose cultivars under polyhouse condition” was undertaken to find out the optimum dose of application of nutrients by fertigation combined with growth regulators for increasing yield and quality rose cut flowers. The study was initiated with the following objectives.

1) To study the effect of different levels of fertigation on growth, yield and quality of rose under polyhouse condition.

2) To study the effect of different growth regulators on growth, yield and quality of rose under polyhouse condition.

3) To study the interaction effects of fertigation and growth regulators on growth, yield and quality of rose under polyhouse condition.

4) To work out cost economics.