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## Environmental conditions and quality of lili0m flowers in Polyhouses

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### Abstract

Floriculture is the study of cultivation of flowers, foliage and other planting materials for the export purpose. India has best climatic conditions for growing different types of flowers throughout the country. Polyhouse is one of the best technologies to grow the quality product and get the maximum flower production in small area. To increase the use of polyhouses, government of India provides the subsidy upto 65 per cent of the total cost to the farmers. So, marginal farmers also can purchase and grow the flowers and get the maximum profits by minimum investment. Keeping the above facts in mind, the present study was planned and conducted in Panipat district of Haryana state on farmers having different floricultural units i.e. of Lili0m flowers. It was found in the study that the environmental parameters i.e. light, temperature, humidity and CO<sub>2</sub> level were higher in natural ventilated polyhouse (NVPH) than the anti insect shade net house (AISNH) and quality of flowers was also found better in NVPH polyhouse.

**Keywords:** Environment, floriculture, flowers, lili0m, polyhouses, quality

### Introduction

Floriculture is an important branch of Horticulture discipline of agricultural industry. It deals with the farming of flowers (cut flowers or loose flowers), ornamental plants, foliage and raw material for different cosmetic products for trading. Floriculture is also concerned with production of planting materials through seeds cutting, budding and grafting for their marketing. Carnation, gerbera, orchids, rose, chrysanthemum, tulip, lilies and gladiolus are some very important commercial flowers in the international market. The importance and potential of floriculture is unlimited and rising day by day. Floriculture trade is developing at the rate of 15 per cent, crossed worth of \$17 billion (Nazir, 2015) <sup>[6]</sup>. Developed countries contribute more than 90 per cent of the total world floriculture trade whereas only Netherlands contributed 60 per cent of world floriculture exports in 2013. Annual Growth Rate of marketing of flowers during 2006-2015 was five per cent (Vahoniya *et al.* 2018) <sup>[10]</sup>. Share of Indian fresh flowers in the world floriculture trade is not appreciable i.e. near 0.40 to 0.50 per cent as compared to Netherlands (65%), Columbia (12%), Italy (6%), Israel (4%), Kenya (1%) and other countries share was near 20 per cent (Harisha 2017) <sup>[5]</sup>. The main importers were USA, Netherlands, UK, Germany and United Arab Emirates of the Indian floriculture products during 2017-18. The main products were roses, bulbs, flowering plants, cut flowers for bouquets and foliage. According to Agricultural and Processed Food Products Export Development Authority (APEDA), floriculture has been viewed as sunshine industry and is gaining importance in the aspect of export value. The demand for fresh flowers has steadily increased not only for decoration but also for many other purposes like essential oils, cosmetics, aroma therapy, dry flowers, natural dyes, medicines, etc and also due to changing the lifestyle of people aesthetically. India is blessed with best ecological conditions for agriculture and for floriculture especially during the winter season. These factors provide India all the potential to emerge as a leader of world floriculture trade and help our farmers to grow different types of flowers which are commercially important and can be found in different parts of India. Roses, gerbera, lili0m and carnations are produced for both domestic market and export purposes. Since the demand for cut flowers is increasing, protected cultivation in the polyhouse is emerging as the best alternative because it helps in using the land and other valuable resources more effectively. Polyhouse is basically made of glass or plastic film. Polyhouse allows only solar radiation to day pass through but traps the thermal radiation which is emitted by the plants inside the polyhouse. It allows us to control temperature, humidity and the intensity of light suitable for the production of flowers (Slathia *et al.* 2018) <sup>[18]</sup>.

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Polyhouses have the mechanism to control the temperature upto the 10-15 °C during the eight months of the year. Due to this, wastage of flowers can be decreased upto 15-20 per cent during the crop season and flowers growth is uniform and farmers can get maximum level of profits Asit (2012) [3]. Polyhouse provides different benefits such as reduce dependency on rainfall, other water resources which are limited today and better use of small area of the land for more production. With the help of polyhouses, producers can create suitable ecological conditions for the best quality and production of flowers. Toppo (2018) [9] reported that outer environment cannot affect the production of crops under the polyhouses and polyhouses in controlled conditions gave 4-8 times more production than the open cultivation. Hence, farmers should adopt the controlled structure for increasing the production because polyhouses are structured to increase the production of crops or off season production by providing the suitable environmental conditions *viz*: light, temperature, humidity, air circulation etc. Demand of polyhouse farming in floriculture is increasing its demand in agriculture market. In India the future of polyhouses are bright as we can see a changing trend towards tropical flowers and availability of ecological conditions and diversity in the flora.

Government of India established an Authority named Agricultural and Processed Food Products Export Development Authority (APEDA) under the act of Agricultural Processed Food Products in December, 1985. APEDA replaced the Processed Food Export Promotion Council (PFEPC). It works for the development of agricultural industry, registration of person for the exports purpose, improving the market at the national and international level. It provides subsidy for establishing of cold storage, pre-cooling units, refrigerator vans and for green or polyhouses. NABARD provides refinance assistance for the

hi-tech at the reasonable rate of interest. Such steps by government in the development of floriculture business provided farmers an opportunity to generate more income jobs and most importantly empowerment. Government of India organized some programmes to motivate the farmers, support the farmers and to provide the trainings about floriculture in protected environment to adopt the protective cultivation. Keeping the above facts in mind, the present study was planned with the following objectives i.e. to observe the environmental conditions and to compare the quality of flowers i.e. Lilium grown in different types of polyhouses.

**Material and methods:** For achieving the above said objectives, Panipat district of Haryana state was selective randomly. Anti Insect Shade Net House (AISNH) and Natural Ventilated Polyhouse (NVPH) in which lilium flower grown by the farmers were selected randomly in the selected district. For the environmental conditions, light, temperature, humidity and CO<sub>2</sub> were calculated with the help of their respective instruments i.e. lux meter, thermometer, hygrometer and air quality meter respectively. Mean and SD were calculated to find out the difference between environmental parameters of AISNH and NVPH types of polyhouse. For comparing the quality of flowers, per cent of difference of increase or decrease, average and ranks were calculated.

## Results and Discussion

### Environmental conditions in different types of polyhouses

Table 1 unfolds the environmental parameters which include light, temperature, humidity and CO<sub>2</sub>. Almost all the parameters were higher in the NVPH type of polyhouse than the AISNH type of polyhouse.

**Table 1:** Environmental conditions in different types of polyhouses

Sr. No.	Environmental Parameters	AISNH	NVPH	Difference
		Mean & Sd	Mean & Sd	
1	Light (lux)	301.14 (+9.83)	374.67 (+8.02)	73.53
2	Temperature (°C)	26.00 (+0.46)	26.21 (+1.53)	.21
3	Humidity (%)	55.88 (+4.51)	82.77 (+1.67)	27.22
4	CO <sub>2</sub> (ppm)	486.43 (+17.13)	1226.11 (+12.74)	739.68

Light observed in NVPH type of polyhouses was 374.67 +8.02 lux and 301.14 +9.83 lux was in AISNH. There was not much difference in temperature i.e. only 0.21 lux between the temperatures of both types of polyhouses. CO<sub>2</sub> level and humidity were also higher in NVPH and observed differences were 739.68 ppm and 27.22 per cent respectively between

both types of polyhouses. Singh *et al.* (2012) conducted a study in the open field conditions and concluded that 3.5 °C more temperature was recorded inside the net houses. Comparatively significant reduction of solar radiation was recorded inside net houses *i.e.* less solar radiation was found inside the net-houses as compared to open field conditions.



Lilium in NVPH



Lilium in AISNH

**Table 2:** Quality of Lilium flowers grown in different types of polyhouses (n=4)

Sr. No.	Parameters	AISNH	NVPH	Difference	% difference
		Value	Value		
1	Diameter of flowers (cm)	15.00	18.50	+03.50	2.90
2	Height of flowers (cm)	17.02	18.28	+01.26	7.14
3	Diameter of sticks/spikes (cm)	0.80	0.90	+0.10	11.76
4	Length of spike (cm)	78.10	96.19	+18.09	20.76
5	Buds per sticks/spikes (in numbers)	4	4	0.00	-
6	Number of petals	6	6	0.00	-
7	Shelf life of flowers (days)	12	13	+01.00	8.00

### Quality of Lilium flowers grown in different types of polyhouses:

Table 2 illustrates the quality of lilium flowers in terms of diameter of flowers, height of flowers, diameter sticks, length of sticks etc. in AISNH and NVPH type of polyhouses. It shows that quality of lilium flowers in all the parameters except buds per stick and number of petals per flower was better in flowers grown in NVPH type of polyhouse than the AISNH. Diameter of flowers, height, diameter of sticks, length of sticks and shelf life of flowers grown in NVPH were 2.90, 7.14, 11.76, 20.76 and 8.00 per cent respectively higher than the flowers grown in AISNH type of polyhouse. Fatmi *et al.* (2017) [4] evaluated the growth level of Asiatic lily in two types of protected structures *i.e.* NVPH and shade net house. The observations indicated that quality and quantity of flowers depended on the environmental factors. These factors were light, humidity, air circulation etc. in open area and polyhouses. Study also found that plant height was 50.7 cm, and leaf area was 17.84 cm highest under shade net house whereas the flower characters *i.e.* early flower opening (33.6 days), number of buds (4.4), flower width (13.33cm) and shelf life (13.9 days) were found in NVPH. Stem length (50.7cm) was highest in the shade net house.

**Table 3:** Quality of Lilium flowers on the basis of judgment of experts

Sr. No.	Parameters	AISNH	NVPH
		Mean score	Mean score
1	Color	4.10	4.50
2	Texture of flower	3.70	4.10
3	Hardness of sticks/spikes	3.90	4.90
4	Overall appearance of flowers	4.00	4.20
	Total score	15.70	17.70
	Mean	3.92	4.43
	Rank	II	I

### Quality of Lilium flowers on the basis of judgment of experts:

Table 3 shows the quality of flowers on the basis of judgment of experts including color, texture, hardness and overall appearance of flowers. These parameters were judged on 1-5 point continuum score (1=lowest score and 5=highest score). It was found that all the qualitative parameters of flowers scored highest in the NVPH polyhouse than AISNH type of polyhouse. In totality NVPH type of polyhouse scored 17.70 (ranked I) and AISNH scored 15.70 (ranked II).

### Conclusion

Quality of flowers dependent upon the environmental parameters of the polyhouses that provide the favorable conditions to the flowers to grow. Quality of the lilium flowers grown in NVPH polyhouse was better in all aspects *i.e.* diameter of flowers and spikes/sticks, height, length of spikes/sticks, color, appearance etc.

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