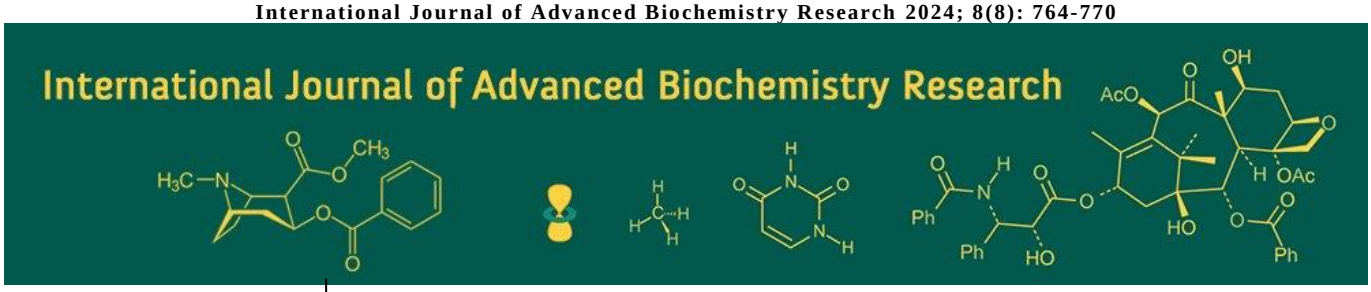


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# Effect of different growing condition with growing media on growth, flowering and yield of Asiatic lilium

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**Abstract**
An experiment on "Influence of different growing condition with media on growth, flowering and yield of Asiatic lilium" was conducted during the year 2020-21 and 2021-22 at ornamental flower nursery, College of Horticulture, Anand Agricultural University, Anand, Gujarat. The Experiment was laid out in Completely Randomized Black Design (Factorial) with three repetition and sixteen treatment combinations comprising of four different growing condition ($G_1$- 75% Green colour shade net, $G_2$- 75% White colour shade net, $G_3$- 75% Black colour shade net and $G_4$- Open condition) and four different media combinations [($M_1$- Soil: Cocopeat: Vermiculite (5:3:2), $M_2$- Soil: Sand: FYM (4:3:3), $M_3$-Cocopeat: Soil: Sand (5:3:2), $M_4$- Cocopeat: Vermiculite: Perlite (7:2:1). Growing of Asiatic Lilium in $G_3$- 75% black colour shade net recorded minimum number of days taken to sprouting of bulb, minimum number of days taken to first bud appearance, number of days taken to first flower opening while, the maximum number of flower per plant were observed in $G_1$-75% green colour shade net. Whereas, the maximum diameter of flower and number of daughter bulb were recorded with the treatment of $G_4$- Open condition. In case of the growing media combination the higher number of bulb were observed with the treatment combination. $M_4$- Cocopeat: Vermiculite: Perlite (7:2:1).Whereas, the diameter of bulb were observed with the treatment $M_1$- soil: cocopeat: vermiculite (5:3:2 v/v). Interaction effect of growing condition and different growing media with respect to growth parameter like number of days taken to sprouting, flowering parameters like number of days taken to first bud appearance, days taken to first flower opening and the yield parameter like number of daughter bulb was remained non-significant. Growing of Asiatic lilium with the treatment combination of $G_3M_4$- 75% Black colour shade net and media combination of Cocopeat: Vermiculite: Perlite (7:2:1 v/v) recorded maximum number of flower per plant. While the diameter of bulb was recorded maximum with the treatment combination $G_4M_1$ [open condition +Soil: Cocopeat: Vermiculite (5:3:2).

**Keywords:** Growing condition, growing media, growth, flowering and yield

## Introduction
Lilium is one of the most fascinating ornamentals in appearance, beauty, different forms and hues of colours, and it is a low volume, high value crop. It has been depicted as a symbol of purity and regality. It has a wide applicability in the floral industry as cut flowers and potted plant (Jana and Roychoudhary, 1989) [9]. It is native to the Northen hemisphere and widely distributed in china, Japan, South Canada, Siberia and it extends into Florida in the U.S.A.
Lilium is one of the six major genera of flower bulbs produced worldwide (Nard and Hertogh, 1993) [14]. It is a species of great economic importance in production and commercialization of cut flower in the international market (Jimenez *et al*., 2012) [10]. It is also high in price and very popular; due to its richness and variety of colours and vast no of flowers it produces. Due to its size, beauty and longevity Lilium is one of the ten most superior cut flowers in the world. Lilium is one of the utmost common bulbous ornamental plants (Thakur *et al*., 2005) [25]. The cultivars of genus Lilium are highly appreciated by the horticulturists for their outstanding range of colour, fragrance and adaptability to several environmental conditions (Bahr and Compton, 2004) [2].
The cultivation of Asiatic lilium in net house can play a better role in improving quality, as well as increasing flowering span and it also reduce the incidence of insect pest as compared to open field. Shade nets found in the market come in different shading percentages and colours. When using shade nets of different colours, the black one reflect harmful UV radiation from sunlight.

The most common colour is green, which neither reflects nor absorbs excessive radiation. Conversely, white shade nets enhance positive energy in the surroundings by reflecting most radiation and heat. This makes different environmental condition inside the different colour shade nets.

Use of shade net aims to optimize desirable physiological responces, in addition to providing physical protection and substantial effect on shoot elongation, branching and flowering in ornamental crops (Oren-Shamir *et al*., 2001) [18]. The colour shade nets approach was evaluated in ornamentals (Nissim-Levi *et al*., 2008) [16], vegetables (Fallik *et al*., 2009) [7] and fruit trees (Shahak *et al*., 2004) [22]. Coloured shade nets not only exhibit special optical properties that allow the control of light, but also have the advantage of influencing the microclimate to which the plant exposed and offer physical protection against excessive radiation, insect pest and environmental changes (Shahak *et al*., 2004) [22]. The air temperature was lower than that of ambient air, depending on the shading intensity. Shade net only decrease light quantity but also alters light quality to a varying extent and might also change other environmental condition (Smith *et al*., 1984) [23].

Among several factors influencing growth, yield and quality of flowers, including lilium, selection of suitable varieties/ Hybrids for the local agro climatic situation plays a significant role in addition to appropriate cultural practices and management skills. Growing media is also another important factor which influences various growth and flowering parameters to a greater extend. In this context protective cultivation is the need of the hour which ensures higher production of quality flowers that fetches higher income to the flower growers. However, information on these aspects under agro climatic conditions of Gujarat with respect to commercial cultivation of lilium is lacking.

The aim of this study is to investigate how various growing conditions and media compositions, including sand, cocopeat, vermiculite and perlite impact the vegetative and reproductive growth of Asiatic lilium.

## Materials and Methods

The present investigation on "Influence of different growing condition with media on growth, flowering and yield of Asiatic lilium" was conducted in the year 2020-21 and 2021-22 at Ornamental flower nursery, College of Horticulture, Anand Agricultural University, Anand Gujarat. The experiment was laid out in Completely Randomized Design (Factorial) with three repetitions and sixteen treatment combinations comprising of four growing conditions $G_1$: 75% Green colour shade net, $G_2$: 75% White colour shade net**,** $G_3$: 75% Black colour shade net**,** $G_4$: Open condition and four media combination. In case of four different growing conditions and four media combination $M_1$: Soil: Cocopeat: Vermiculite (5:3:2), $M_2$: **S**oil: Sand: FYM (4:3:3), $M_3$: Cocopeat: Soil: Sand (5:3:2), $M_4$: Cocopeat: Vermiculite: Perlite (7:2:1) v/v were taken for an experiment.

Observations of growth, flowering and yield parameters were recorded from the five tagged plants were selected from each repetition, was recorded and average value was calculated.

The numbers of days taken to sprouting were counted right from the date of planting of Asiatic lilium bulb to the appearance of bulb sprouting to the soil surface. The number of days of planting to the appearance of first flower bud to become visible was determined and calculated; the total number of fully bloomed flowers were counted and recorded. The diameter of bulb was measured in centimetre using digital vernier callipers after dug out the bulb from soil were measured and calculated. The numbers of daughter bulb were counted after harvesting the spike all plants had dried up subsequently all the bulbs were cleaned up separately.

In order to study the average effect of different treatments over the years, the pooled analysis was carried out as suggested by Panse and Sukhatme (1967) [19].

## Results and Discussion

Among different growth, flowering and yield parameters, number of days taken to sprouting, days taken to first bud appearance, days taken to opening of flower, number of flower, diameter of bulb and number of daughter bulb were affected significantly by the growing conditions and growing media.

**Table 1:** Effect of different growing condition and growing media on days taken to sprouting of Asiatic Lilium.

| Treatment | | Days taken for sprouting | | |
|---|---|---|---|---|
| | | 2020-21 | 2021-22 | Pooled |
| **Growing condition** | | | | |
| $G_1$ | 75% Green colour shade net | 5.82 | 5.98 | 5.90 |
| $G_2$ | 75% White colour shade net | 5.52 | 5.62 | 5.57 |
| $G_3$ | 75% Black colour shade net | 5.13 | 5.23 | 5.18 |
| $G_4$ | Open condition | 10.13 | 10.38 | 10.26 |
| | S. Em. ± | 0.08 | 0.13 | 0.08 |
| | C.D.at 5% | 0.24 | 0.37 | 0.22 |
| Media | | | | |
| $M_1$ | Soil: Cocopeat: Vermiculite (5:3:2) | 6.62 | 6.73 | 6.68 |
| $M_2$ | Soil: Sand: FYM (4:3:3) | 7.28 | 7.42 | 7.35 |
| $M_3$ | Cocopeat: Soil: Sand (5:3:2) | 6.97 | 7.08 | 7.03 |
| $M_4$ | Cocopeat: Vermiculite: Perlite (7:2:1) | 5.73 | 5.98 | 5.86 |
| | S. Em. ± | 0.08 | 0.13 | 0.08 |
| | C.D.at 5% | 0.24 | 0.37 | 0.22 |
| | Year | - | - | NS |
| | Significant Interaction | - | - | - |
| | C.V.% | 4.41 | 6.59 | 5.63 |

The data presented in Table-1 revealed that growing conditions and growing media showed significant responses with regards to days taken to sprouting of Asiatic lilium. The minimum number of days taken to sprouting (5.13, 5.23 and 5.18, respectively) were observed in 75% black shade net ($G_3$) during both the years and pooled analysis. While, maximum numbers of days taken for sprouting of bulb (10.13, 10.38 and 10.26, respectively) were noted in treatment $G_4$ treatment *i.e.*, open condition during both the years and pooled analysis. It might be due to coloured shade net exhibited special optical properties and influences the microclimate (Oren-Shamir *et al.* 2001) [18]. Under shade net condition during the early winter higher humidity and mild temperature is developed other side under open condition slightly higher temperature with lower humidity resulting late sprouting.

The maximum number of days taken to sprouting of Asiatic Lilium. Significantly lower number of days taken for sprouting of bulb (5.73, 5.98 and 5.86, respectively) were recorded in $M_4$ treatment Cocopeat: Vermiculite: Perlite (7:2:1) during both the years and pooled analysis. Whereas, the maximum number of days taken for sprouting of bulb (7.28, 7.42, and 7.35, respectively) were recorded in media combination of Soil: Sand: FYM (4:3:3) $M_2$ treatment during both the years and pooled analysis.

This might be attributed to the fact that cocopeat amended with vermiculite and perlite has resulted in optimum porosity and aeration providing favorable conditions for tender sprout to grow and favouring early sprouting. Early sprouting in cocopeat based medium was reported by Lyngdoh *et al.* (2015) [13] during scale propagation in lilium. Better sprouting of bulb of amaryllis belladonna was also observed in medium containing mushroom compost in comparison to control Bostan *et al.* (2014) [4, 5]. Similar findings were observed by Rajera *et al.* (2017) in LA hybrid lily.

**Table 2:** Effect of different growing condition and growing media on number of days taken to first bud appearance of Asiatic Lilium

| Treatment | | Days taken to first bud appearance | | |
|---|---|---|---|---|
| | | 2020-21 | 2021-22 | Pooled |
| **Growing condition** | | | | |
| $G_1$ | 75% Green colour shade net | 24.88 | 24.55 | 24.72 |
| $G_2$ | 75% White colour shade net | 24.52 | 24.25 | 24.38 |
| $G_3$ | 75% Black colour shade net | 24.28 | 23.90 | 24.09 |
| $G_4$ | Open condition | 31.32 | 30.93 | 31.13 |
| | S. Em. ± | 0.25 | 0.25 | 0.18 |
| | C.D.at 5% | 0.73 | 0.71 | 0.50 |
| Media | | | | |
| $M_1$ | Soil: Cocopeat: Vermiculite (5:3:2) | 25.33 | 25.05 | 25.19 |
| $M_2$ | Soil: Sand: FYM (4:3:3) | 28.03 | 27.53 | 27.78 |
| $M_3$ | Cocopeat: Soil: Sand (5:3:2) | 27.05 | 26.80 | 26.93 |
| $M_4$ | Cocopeat: Vermiculite: Perlite (7:2:1) | 24.58 | 24.25 | 24.42 |
| | S. Em. ± | 0.25 | 0.25 | 0.18 |
| | C.D.at 5% | 0.73 | 0.71 | 0.50 |
| | Year | - | - | NS |
| | Significant Interaction | - | - | - |
| | C.V.% | 3.36 | 3.29 | 3.32 |

The data presented in Table-2 revealed that growing conditions and growing media showed significant responses with regards to days taken to first bud appearance of Asiatic lilium. The minimum numbers of days taken to first bud appearance were observed in $G_3$ treatment *i.e.*, 75% black shade net condition (24.28, 23.90 and 24.09, respectively) during both the years and pooled analysis, which was at par with $G_1$ treatment in the years 2020-21, 2021-22 and in $G_2$ treatment during both the years and pooled analysis. Whereas, the maximum number of days taken to first bud appearance (31.32, 30.93 and 31.13, respectively) were observed in open condition ($G_4$) treatment during both the years and pooled analysis. It might be due to black shade nets create an optimal microenvironment by regulating temperature, light intensity, and humidity, while also reducing environmental stresses and improving hormonal balances. These conditions collectively promote faster bud initiation by enhancing the physiological processes required for bud development.

Significantly minimum number of days taken to first bud appearance (24.58, 24.25 and 24.42, respectively) were observed in the treatment ($M_4$) Cocopeat: Vermiculite: Perlite (7:2:1) during both the years and pooled analysis. Whereas, the maximum number of days taken to first bud appearance (28.03, 27.53 and 27.78, respectively) were noted in treatment ($M_2$) Soil: Sand: FYM (4:3:3) during both the years and pooled analysis.

The data presented in Table-3 revealed that growing conditions and growing media showed significant responses with regards to days taken to opening of flower.

Significantly minimum numbers of days taken to opening of flower (71.58, 70.97 and 71.28, respectively) were found in the treatment ($G_3$) 75% black shade net condition in the years 2020-21, 2021-22 and pooled data.These finding were statistically at par with $G_1$ treatment in the years 2020-21, 2021-22 and in $G_2$ treatment during both the years and pooled analysis. It might be due to black shade net creates a more controlled and optimal growing environment by providing consistent, diffused light, better temperature regulation, higher humidity, and protection from environmental stressors. These conditions collectively enhance the physiological processes in Asiatic lilium plants, leading to earlier flower opening compared to others.

The minimum number of days taken to opening of flower (70.87, 70.32 and 70.59, respectively) were consistently noted in ($M_4$) treatment Cocopeat: Vermiculite: Perlite (7:2:1 v/v) during both the years and pooled analysis. Whereas, the maximum number of days taken to opening of flower (74.52, 74.42 and 74.47, respectively) were noted in treatment ($M_2$) Soil: Sand: FYM (4:3:3 v/v) during both the years and pooled analysis.

**Table 3:** Effect of different growing condition and growing media on days taken to opening of flower of Asiatic Lilium.

| Treatment | | Days taken to opening of flower | | |
|---|---|---|---|---|
| | | 2020-21 | 2021-22 | Pooled |
| **Growing condition** | | | | |
| $G_1$ | 75% Green colour shade net | 72.51 | 72.05 | 72.27 |
| $G_2$ | 75% White colour shade net | 72.08 | 71.58 | 71.83 |
| $G_3$ | 75% Black colour shade net | 71.58 | 70.97 | 71.28 |
| $G_4$ | Open condition | 75.18 | 75.00 | 75.09 |
| | S. Em. ± | 0.50 | 0.46 | 0.34 |
| | C.D.at 5% | 1.44 | 1.32 | 0.96 |
| Media | | | | |
| $M_1$ | Soil: Cocopeat: Vermiculite (5:3:2) | 72.37 | 71.98 | 72.17 |
| $M_2$ | Soil: Sand: FYM (4:3:3) | 74.52 | 74.42 | 74.47 |
| $M_3$ | Cocopeat: Soil: Sand (5:3:2) | 73.62 | 72.88 | 73.25 |
| $M_4$ | Cocopeat: Vermiculite: Perlite (7:2:1) | 70.87 | 70.32 | 70.59 |
| | S. Em. ± | 0.45 | 0.45 | 0.34 |
| | C.D.at 5% | 1.31 | 1.31 | 0.96 |
| | Year | - | - | NS |
| | Significant Interaction | - | - | - |
| | C.V.% | 2.39 | 2.19 | 2.29 |

It might be due to the combination of cocopeat, vermiculite and perlite creates a well-balanced and nutrient-rich substrate, promoting optimal root development and efficient nutrient uptake. The enhanced nutrient availability and balanced moisture retention within the media stimulate early bud initiation and development. Additionally, the improved aeration and drainage properties of the media prevent water logging and provide an optimal environment for early flowering. The optimized nutrient supply, moisture management, and root development in the specified media contribute to the early flowering of the lilium grown in this growing medium. These findings of the present investigation are in conformity with the report of Chaudhry *et al.* (2018) [6] and Seyedi *et al.* (2012) [21] in lilium, Treder (2008) [26] in orient lily, Lalmuanpuii *et al.* (2021) [12] in gerbera, Balan *et al.* (2022) [3] in tuberose.

**Table 4:** Effect of different growing condition and growing media on number of flower per plant of Asiatic Lilium.

| Treatment | | Number of flower | | |
|---|---|---|---|---|
| | | 2020-21 | 2021-22 | Pooled |
| **Growing condition** | | | | |
| $G_1$ | 75% Green colour shade net | 2.53 | 2.45 | 2.49 |
| $G_2$ | 75% White colour shade net | 2.42 | 2.33 | 2.38 |
| $G_3$ | 75% Black colour shade net | 2.50 | 2.38 | 2.44 |
| $G_4$ | Open condition | 2.15 | 2.22 | 2.18 |
| | S. Em. ± | 0.06 | 0.06 | 0.04 |
| | C.D.at 5% | 0.16 | 0.16 | 0.11 |
| Media | | | | |
| $M_1$ | Soil: Cocopeat: Vermiculite (5:3:2) | 2.50 | 2.33 | 2.42 |
| $M_2$ | Soil: Sand: FYM (4:3:3) | 2.05 | 2.10 | 2.08 |
| $M_3$ | Cocopeat: Soil: Sand (5:3:2) | 2.25 | 2.20 | 2.23 |
| $M_4$ | Cocopeat: Vermiculite: Perlite (7:2:1) | 2.80 | 2.75 | 2.78 |
| | S. Em. ± | 0.06 | 0.06 | 0.04 |
| | C.D.at 5% | 0.16 | 0.16 | 0.11 |
| | Year | - | - | - |
| | Significant Interaction | G x M | G x M | G x M |
| | C.V.% | 7.98 | 8.26 | 8.12 |

The data presented in Table-4 revealed that growing conditions and growing media showed significant responses with regards to number of flower per plant.

The maximum number of flower per plant (2.53, 2.45 and 2.49, respectively) were recorded in $G_1$ treatment (75% green shade net condition) during both the years and pooled analysis, which was at par with the treatment $G_2$ and $G_3$ during both the years and pooled analysis. Whereas, the minimum number of flowers per plant (2.15, 2.22 and 2.18, respectively) were observed in $G_4$ treatment open condition during both the years and pooled analysis. It might be because of green shade nets create an optimal growing environment by managing light intensity, temperature and humidity. These conditions enhance key physiological processes such as photosynthesis, water use efficiency and hormonal regulation, all of which contribute to an increased number of flowers in Asiatic lilium plants.

The highest number of flower per plant (2.80, 2.75 and 2.78, respectively) were observed in treatment ($M_4$) Cocopeat: Vermiculite: Perlite (7:2:1 v/v) during both the years and pooled analysis. While the lowest number of flower per plant (2.05, 2.10 and 2.08, respectively) were observed in ($M_2$) treatment Soil: Sand: FYM (4:3:3 v/v) during both the years and pooled analysis.

The reason for maximum numbers of flower per plant is due to better growing condition and good physic-chemical properties of media containing cocopeat and vermiculite either with soil or perlite. These findings are agreement with the result obtained by Grassotti *et al.* (2003) [8] and Tehranifar *et al.* (2011) [24] in lilium, Awang *et al.* (2009) [1] in celosia, Kale *et al.* (2009) [11] in gerbera.

**Table 5:** Effect of different growing condition and growing media on diameter of bulb of Asiatic Lilium.

| Treatment | | Diameter of bulb (cm) | | |
|---|---|---|---|---|
| | | 2020-21 | 2021-22 | Pooled |
| **Growing condition** | | | | |
| $G_1$ | 75% Green colour shade net | 3.68 | 3.72 | 3.70 |
| $G_2$ | 75% White colour shade net | 3.77 | 3.71 | 3.74 |
| $G_3$ | 75% Black colour shade net | 3.78 | 3.65 | 3.72 |
| $G_4$ | Open condition | 4.66 | 4.51 | 4.59 |
| | S. Em. ± | 0.06 | 0.04 | 0.04 |
| | C.D.at 5% | 0.18 | 0.12 | 0.11 |
| Media | | | | |
| $M_1$ | Soil: Cocopeat: Vermiculite (5:3:2) | 4.58 | 4.45 | 4.52 |
| $M_2$ | Soil: Sand: FYM (4:3:3) | 3.45 | 3.35 | 3.40 |
| $M_3$ | Cocopeat: Soil: Sand (5:3:2) | 3.89 | 3.84 | 3.86 |
| $M_4$ | Cocopeat: Vermiculite: Perlite (7:2:1) | 3.98 | 3.95 | 3.96 |
| | S. Em. ± | 0.06 | 0.04 | 0.04 |
| | C.D.at 5% | 0.18 | 0.12 | 0.11 |
| | Year | - | - | Sig. |
| | Significant Interaction | G x M | G x M | G x M |
| | C.V.% | 5.55 | 3.67 | 4.72 |

The data presented in Table- 5 revealed that growing conditions and growing media showed significant responses with regards to diameter of flower of Asiatic lilium.

The significantly maximum diameters of Asiatic lilium bulb (4.66, 4.51 and 4.59 cm, respectively) were observed in $G_4$ treatment (open condition) during both the years and pooled analysis. Whereas, the minimum diameter of bulb (3.68, 3.72 and 3.70 cm, respectively) were observed in treatment $G_1$ (75% green shade net) during both the years and pooled analysis. Open field conditions typically provide ample sunlight compared to shaded or indoor environments. Increased sunlight exposure stimulates robust photosynthesis, leading to enhanced growth and development of plant, which ultimately increase the bulb characteristics of plant.

The maximum diameter of bulb (4.58, 4.45, 4.52 cm, respectively) were recorded in $M_1$ treatment Soil: Cocopeat: Vermiculite (5:3:2 v/v) during both the years and pooled analysis. While, the minimum diameter of bulb (3.45, 3.35 and 3.40 cm, respectively) were noted in treatment ($M_2$) Soil: Sand: FYM (4:3:3 v/v) during both the years and pooled analysis.

Promising bulb attributes could be due to better physical, chemical and biological properties of the media containing, cocopeat and vermiculite either with soil or perlite which provide congenial root environment for proper growth of bulb and bulblets. Chaudhary *et al.*, (2018) [6] in lilium. These findings are in agreement with the reports of Nazari *et al.* (2011) [15] in hyacinth. Nongdhar *et al.* (2019) [17] about increasing bulb size (perimeter) in cocopeat are in agreement with our results.

The data presented in Table-6 revealed that growing conditions and growing media showed significant responses with regards to number of daughter bulb.

**Table 6:** Effect of different growing condition and growing media on number of daughter bulb per bulb of Asiatic Lilium.

| Treatment | | Number of daughter bulb | | |
|---|---|---|---|---|
| | | 2020-21 | 2021-22 | Pooled |
| **Growing condition** | | | | |
| $G_1$ | 75% Green colour shade net | 0.80 | 0.70 | 0.75 |
| $G_2$ | 75% White colour shade net | 0.85 | 0.78 | 0.82 |
| $G_3$ | 75% Black colour shade net | 0.90 | 0.78 | 0.84 |
| $G_4$ | Open condition | 0.52 | 0.50 | 0.51 |
| | S. Em. ± | 0.06 | 0.05 | 0.04 |
| | C.D.at 5% | 0.17 | 0.13 | 0.11 |
| Media | | | | |
| $M_1$ | Soil: Cocopeat: Vermiculite (5:3:2) | 0.87 | 0.78 | 0.83 |
| $M_2$ | Soil: Sand: FYM (4:3:3) | 0.50 | 0.48 | 0.49 |
| $M_3$ | Cocopeat: Soil: Sand (5:3:2) | 0.73 | 0.63 | 0.68 |
| $M_4$ | Cocopeat: Vermiculite: Perlite (7:2:1) | 0.97 | 0.87 | 0.92 |
| | S. Em. ± | 0.06 | 0.05 | 0.04 |
| | C.D.at 5% | 0.17 | 0.13 | 0.11 |
| | Year | - | - | NS |
| | Significant Interaction | - | - | - |
| | C.V.% | 27.41 | 22.86 | 25.50 |

The Maximum number of daughter bulb of Asiatic lilium were significantly observed (0.90, 0.78 and 0.84, respectively) in the treatment $G_3$ (75% black shade net) during both the years and pooled analysis, which was at par with the treatment ($G_1$) and ($G_2$). While, the minimum number of daughter bulb (0.52, 0.50 and 0.51, respectively) were observed in treatment ($G_4$) open condition during both the years and pooled analysis. Plants in open conditions have less competition for resources such as sunlight, water, and nutrients. It provides ample space for root expansion and bulb multiplication.

The significantly maximum number of daughter bulb (0.97, 0.87 and 0.92, respectively) were noted in treatment ($M_4$) Cocopeat: Vermiculite: Perlite (7:2:1 v/v) during both the years and pooled analysis, which was at par with the treatment ($M_1$),While the minimum number of daughter bulb (0.50, 0.48 and 0.49, respectively) noted in the treatment ($M_2$) Soil: Sand: FYM (4:3:3 v/v) during both the years and pooled analysis.

From above data it can again be attributed to higher translocation of carbohydrates to the underground portions contributing more towards bulb per bulblets multiplication in the medium.

**Interaction effect of different growing condition and growing media on growth and yield parameters of lilium.**

The data depicted in Table-7 revealed that interaction effect of different growing conditions and growing media with respect to number of flower per plant and diameter of flower were remained significant. The maximum Number of flower per plant (3.03) were recorded with the treatment combination $G_3M_4$ [75% Black colour shade net + Cocopeat: Vermiculite: Perlite (7:2:1)] in pooled analysis. Whereas, the diameter of bulb (5.12 cm) was noted maximum with the treatment combination $G_4M_1$ [open condition +Soil: Cocopeat: Vermiculite (5:3:2)] in pooled analysis.

**Table 7:** Interaction effect of different growing condition and growing media on flowering and yield parameters of Asiatic Lilium. (Pooled of two years)

| Growing conditions Growing condition | Number of flower per plant | | | | Diameter of bulb (cm) | | | |
|---|---|---|---|---|---|---|---|---|
| | 75% Green colour shade net ($G_1$) | 75% White colour shade net ($G_2$) | 75% Black colour shade net ($G_3$) | Open condition ($G_4$) | 75% Green colour shade net ($G_1$) | 75% White colour shade net ($G_2$) | 75% Black colour shade net ($G_3$) | Open condition ($G_4$) |
| $M_1$ :Soil: Cocopeat: Vermiculite (5:3:2) | 2.50 | 2.50 | 2.47 | 2.20 | 4.29 | 4.30 | 4.36 | 5.12 |
| $M_2$ :Soil: Sand: FYM (4:3:3) | 2.30 | 1.97 | 2.03 | 2.00 | 3.19 | 3.40 | 3.27 | 3.73 |
| $M_3$ :Cocopeat: Soil: Sand (5:3:2) | 2.40 | 2.23 | 2.23 | 2.03 | 3.75 | 3.50 | 3.46 | 4.75 |
| $M_4$ :Cocopeat: Vermiculite: Perlite (7:2:1) | 2.77 | 2.80 | 3.03 | 2.50 | 3.56 | 3.76 | 3.78 | 4.75 |
| S. Em. ± | 0.08 | | | | 0.08 | | | |
| C.D.at 5% | 0.22 | | | | 0.21 | | | |

## Conclusion

From the two years of field study, it can be concluded that growing of Asiatic lilium under different growing condition the vegetative parameter *i.e.* number of days taken to sprouting the flowering parameters *i.e.* days taken to first bud appearance, days taken to flower opening were found better under 75% black shade net condition, while number of flower per plant were noted maximum with the 75% green shade net condition. Whereas, the yield parameter like diameter of bulb (cm), number of daughter bulb were found better under open condition. In case of different growing media all vegetative, flowering parameters and yield parameters *i.e* number of daughter bulb the media combination Cocopeat: Vermiculite: Perlite (7:2:1) found superior. Whereas, diameter of bulb were noted found better with the treatment combination Soil: Cocopeat: Vermiculite (5:3:2).

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