



STUDIES ON THE EFFECT OF DIFFERENT GROWING MEDIA ON THE GROWTH AND FLOWERING OF GERBERA CV. GOLIATH.

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Abstract

The experiment was conducted to study the effect of different growing media on growth and flowering of gerbera (*Gerbera jamesonii* H. Bolus) cv. Goliath under naturally ventilated polyhouse. The plants were grown using different growing media viz. coirpith, vermicompost, FYM and garden soil. The experiment was laid out in Completely Randomized Design with eight treatments of different media combinations with three replications. The observations showed that maximum plant height (33.30 cm) and leaf area (165.55 cm²) was recorded in coirpith + vermicompost + FYM + garden soil media (1:1:1:1) (T₇). The number of leaves (24.22) and number of suckers (3.77) was found to be significantly highest for coirpith + vermicompost + garden soil media (1:1:1) (T₆). The coirpith + vermicompost + garden soil media (1:1:1) (T₆) was found to be significant for all flowering characters viz., days to first flowering (84.00 days), stalk length (62.53 cm), stalk diameter (0.70 cm), flower diameter (10.76 cm), flower weight (31.11 g), number of flowers (6.22), period of flower retention (11.77 days) and vase life (7.33 days). Therefore, coirpith and vermicompost based media combination was considered as a superior growing media for enhanced growth and flowering of gerbera.

Introduction

Gerbera is an important cut flower widely used for aesthetic purpose and ranks fifth among top ten cut flowers of world market. The major production of gerbera has been reported in Assam, Maharashtra, Karnataka, Tamil Nadu, Sikkim, Uttarakhand and West Bengal. It is native to tropical regions of South America, Africa and Asia and suitable for growing in hilly ranges at an altitude of 1000 to 2000m. Improved production technology is being used for getting best quality blooms in order to meet the export standards. Recently it is reported that most growers prefer to grow the plants in growing medium under protected cultivation rather than soil because of its obvious advantages such as decreased fertility of natural soils, pest and disease limitations and increased interest in improving quality of flowers.

Soil alone as a growing medium does not fulfill all requirements for its better growth and flowering quality.

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The use of growing media offers a valuable alternative to conventional use of soil for quality flower production due to their good water holding capacity, aeration and nutrient status (Bergi, 2011). Thereby, soilless substrates are used in horticulture for growing seedlings, plant propagation, ornamental plant production etc. and it also utilizes degraded and barren lands effectively (Ahmad *et al.*, 2012). So, the present investigation was undertaken to study the response of gerbera to the application of different growing media combinations.

Materials and Methods

The experimental work was carried out at Sai Suvedhya Floritech, Berikai, Hosur, Krishnagiri, Tamilnadu during September 2018 to March 2019. The growing media employed in this present investigation are cocopeat, vermicompost, FYM and garden soil. Tissue cultured double type plants of the variety 'Goliath' were purchased from Florance Flora, Bangalore which bears orange coloured flowers. The plants with 4-5 leaves are planted

Table 1: Treatment schedule.

Treatment No.	Particulars
T ₁	Vermicompost + Garden soil (1:1)
T ₂	FYM + Garden soil (1:1)
T ₃	Coirpith + Garden soil (1:1)
T ₄	Vermicompost + FYM + Garden soil (1:1:1)
T ₅	Coirpith + FYM + Garden soil (1:1:1)
T ₆	Vermicompost + Coirpith + Garden soil (1:1:1)
T ₇	Coirpith + Vermicompost + FYM + Garden soil (1:1:1:1)
T ₈ (control)	Garden soil alone

in raised beds prepared by using different growing media combinations and the experiment was laid out in a completely randomized design with three replications consisting of eight treatments each. The details of the growing media treatments are presented in table 1 and each replication consisting of 12 plants planted in 1.5 m² area. The statistical analysis based on the mean values per treatment was made using the technique of analysis of variance with TNAUSTAT.

Results and Discussion

The proper selection of growing media is essential to maintain sufficient anchorage of plant, provision of nutrients and water as well as gaseous exchange between roots and atmosphere outside the growing medium (Abad *et al.*, 2001). The growing media that are light in weight, rich in nutrients and well drained are considered best for the growth and development of flowering plants (Dubey *et al.*, 2013).

The response of different growing media employed in the study influenced various vegetative parameters of gerbera. The results of the present investigation (Table 2) revealed that the plant height (33.30 cm) and leaf area (165.55 cm²) were significantly high in the plants grown in combined media of coirpith + vermicompost + FYM + garden soil (T₇) which was on par with coirpith + vermicompost + garden soil (T₆). These findings were similar to the observations of Barreto and Jagtap (2002) in gerbera, Padhiyar *et al.*, (2017) and Kameshwari *et al.*, (2014) in chrysanthemum by using cocopeat and vermicompost amended media. It might be due to ability of this growing media to provide good aeration to plants in order to sustain the development and growth of roots and shoots. Plant height (28.83 cm) and leaf area (143.44 cm²) was found to be significantly lower in garden soil media (T₈) than other media combinations. It was due to the fact that there was a significant decrease in leaf length and width of African daisy with decreasing level of phosphorus in the growing medium (Nowak, 2001).

Among the different growing media used (Table 1), the maximum number of leaves (24.22) and number of suckers (3.77) were observed in treatment T₆ (coirpith +

vermicompost + garden soil) followed by treatment T₇ (coirpith + vermicompost + FYM + garden soil). The readings are in support of Barreto and Jagtap (2002) and Singh (2018) who reported the same in coirpith + vermicompost media. Though, number of leaves and suckers is mainly influenced by environmental conditions, nutrients present in the growing media are also important in this regard. More

number of leaves in plants reflect good vigour and their suitability to environment and growing media. Since nitrogen in growing media significantly affects plant growth, increase in number of leaves of plants can also be due to adequate availability of nitrogen content in media (Benito *et al.*, 2005 and Khayyat *et al.*, 2007).

The minimum number of days taken for first flower emergence was observed in treatment T₆ (coirpith + vermicompost + garden soil). It might be due to the vigorous growth of the plant growing in the media and the rapid uptake of nutrients and water has a pronounced effect on early production. This is also attributed to accumulation of more photosynthates in this media might have induced early flowering. These results are in accordance with the findings of Chauhan *et al.*, (2014), Singh (2018) in gerbera and Karthikeyan and Jawaharlal (2015) in carnation. As the vegetative growth was found to be better in coirpith and vermicompost media combinations, the flower set was early which results in the production of high quality cut flowers.

Plants grown in substrate containing coirpith + vermicompost + garden soil (T₆) produced longer flower stalk length and flower stalk diameter in gerbera. The observations are in line with the findings of Ahmad *et al.*, (2012) who also recorded the same when grown in combination of mushroom compost with coirpith medium and Chandrappa (2002) in anthurium. Flower growth and development is mainly influenced by the availability of phosphorus in the growing media which supplies to the plants. It ultimately resulted in increased flower stalk length and stalk diameter.

It is evident that the flower diameter and flower weight are important floral traits in gerbera which can make the beauty of flower heads used for decoration. The maximum flower diameter and weight of fresh flowers were reported on plants grown in coirpith + vermicompost + garden soil media (T₆) which was on par with coirpith + vermicompost + FYM + garden soil media (T₇). The production of large sized gerbera flowers is based on the structure, texture, pH, organic matter content as well as NPK levels in the growing media (Lang and Pannuk, 1998). The results clearly indicate that both

Table 2: Effect of different growing media on vegetative growth of gerbera.

Treatments	Plant height (cm)	Number of leaves	Leaf area (cm ²)	Number of suckers
T ₁	31.40	20.22	155.44	2.66
T ₂	30.46	19.66	152.33	2.22
T ₃	31.63	21.77	160.77	3.11
T ₄	30.33	18.77	150.66	1.77
T ₅	31.53	20.55	158.10	2.77
T ₆	33.20	24.22	163.66	3.77
T ₇	33.30	23.88	165.55	3.55
T ₈	28.83	17.33	143.44	1.44
S.Ed.	0.46	0.28	0.69	0.17
CD(P=0.05)	0.98	0.61	1.48	0.37

the growing media possess better physico-chemical properties for growth and flowering in gerbera. The increase in flower size may also be due to the cumulative effect of growth parameters and more accumulation of starch from leaves to flowers. The flower size and flower weight was comparatively lower in garden soil media (T₈) because of the accumulation of salts and higher pH value which was highly detrimental in reducing the flower size. These results are in accordance with the findings of Chauhan *et al.*, (2014), Vamanrao (2015) in gerbera, Bala and Singh (2013) in chrysanthemum.

The data presented in table 3 showed that maximum number of flowers produced per plant was reported in treatment T₆ (coirpith + vermicompost + garden soil) followed by treatment T₇ (coirpith + vermicompost + FYM + garden soil). An increase in number of flowers per plant could be attributed to vigorous vegetative growth of gerbera growing in this media and increasing carbohydrate reserve material with proper uptake of all available nutrients. Similarly, increased availability of essential elements at critical growth stages could have led to increase in number of flowers. The least number

of flowers were observed in treatment T₈ (garden soil media). When kept dry, the garden soil becomes too compact and damages the tender roots, ultimately resulting in poor growth and flowering. The variation in number of flowers per plant may also be attributed to the physico-chemical properties of the substrates. These results are in agreement with the findings of Nowak and Strongy (2003), Ashwath and Pillai (2004), Thangam *et al.*, (2009), Chauhan *et al.*, (2014), Singh (2018) in gerbera, Dutt *et al.*, (2002) and Nair and Bharathi (2015) in chrysanthemum.

The highest field life of the flowers which is nothing but the period of flower retention in plants was observed in treatment T₆ (coirpith + vermicompost + garden soil) and the minimum was recorded in treatment T₈ (garden soil media). Similar readings were observed by Sekar and Sujatha (2000) in gerbera and Padhiyar *et al.*, (2017) in chrysanthemum. The coirpith and vermicompost in the growing media combination provides balanced water nutrients and abundant oxygen supply for healthy growth of a plant.

The freshly harvested flowers remained for a longer period in standard vase solution was noticed in coirpith + vermicompost + garden soil (T₆). Similar findings were reported by Chauhan *et al.*, (2014) and Singh (2018). Gerbera flowers with strong and sturdy stem were less likely to fold in the vase due to turgor pressure (De jong, 1978). The internal storage of carbohydrate content of the flowers was also responsible for longevity and vase life of cut flowers. The vase life of flowers retained only for a shorter time in garden soil media (T₈) and vermicompost + FYM + garden soil media (T₄). These observations go in agreement with Sindhu *et al.*, (2010) who recorded least vase life of gerbera flowers in normal soil amended with FYM and vermicompost.

Conclusion

On the basis of present investigation, the proper

Table 3: Effect of different growing media on flowering parameters of gerbera.

Treatments	Days to first flowering (days)	Flower stalk length (cm)	Flower stalk diameter (cm)	Flower diameter (cm)	Flower weight (g)	Number of flowers per plant	Period of flower retention (days)	Vase life (days)
T ₁	89.22	54.10	0.53	9.53	27.10	4.66	10.66	5.99
T ₂	89.66	52.63	0.46	8.93	24.88	4.11	10.44	5.66
T ₃	86.88	57.26	0.56	10.03	28.77	5.22	11.33	6.44
T ₄	90.11	52.66	0.50	8.20	23.88	3.66	9.55	5.11
T ₅	88.77	52.83	0.53	9.70	26.44	4.88	10.99	5.77
T ₆	84.00	62.53	0.70	10.76	31.11	6.22	11.77	7.33
T ₇	85.44	61.33	0.66	10.40	29.88	5.88	11.55	6.99
T ₈	90.88	49.70	0.36	7.50	22.33	3.11	7.66	4.33
S.Ed.	0.37	1.03	0.05	0.15	0.33	0.19	0.26	0.23
CD(P=0.05)	0.78	2.19	0.10	0.33	0.71	0.40	0.55	0.49

selection of growing media is essential to maintain sufficient anchorage of plant, provision of nutrients and water as well as gaseous exchange between roots and atmosphere outside the growing medium and also the growing media that are light in weight, rich in nutrients and well drained are considered best for the growth and development of flowering plants so it can be concluded that growing media plays a vital role in the production of cut flowers. Further, the plants grown in coirpith and vermicompost based media combinations T₆ (coirpith + vermicompost + garden soil) and T₇ (coirpith + vermicompost + FYM + garden soil) showed better vegetative and flowering parameters because of good vegetative growth converted to reproductive growth of gerbera by optimum range of physical and chemical properties (bulk density, water holding capacity, nutrient status etc.) in that growing media.

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