



Research Paper

Article history :

Received : 07.05.2014

Revised : 13.05.2014

Accepted : 24.05.2014

Effect of different media on growth, flowering and cut flower yield of gerbera under protected condition

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ABSTRACT : An experiment was conducted to study the effect of different media on growth, flowering and cut flower yield in gerbera (*Gerbera jamesonii* Bolus) cv. Alcochete under protected condition using various media viz., normal soil, rice husk, coco peat, castor cake, vermicompost, farm yard manure (FYM) and sawdust. The experiment was conducted in Completely Randomized Design (CRD) with three replications. The results revealed that the media amended with normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1) performed better for maximum plant height (22.93 and 24.50 cm, respectively) and plant spread (34.49 and 42.07 cm², respectively) at first flower appearance and pick flowering stage as well as highest number of leaves and suckers per plant (17.13 and 3.61, respectively). The similar trend was also noted for flowering parameters and lowest number of days to the appearance of first flower bud and opening the first flower (50.16 and 56.83 days, respectively), longest flowering span (141.97 days), diameter of flower (12.03 cm), length of flower stalk (54.59 cm), thickness (6.44 mm), number of ray florets per flower (190.09), longevity (15.70 days) and vase life (10.31 days) of flower were also found better under the treatment of media amended with normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1) (M₄). In case of yield parameters, the same treatment was also found better for fresh and dry weight of cut flower (42.10g and 14.11g, respectively), number of flowers per plant (8.97), per square meter (89.67) and yield of flowers (17.93 lacs/ha). While, the normal soil as control found for poorest response in all parameters.

KEY WORDS : Gerbera, Media, Protected condition, Cut flower

HOW TO CITE THIS ARTICLE : Chauhan, R.V., Varu, D.K., Kava, K.P. and Savaliya, V.M. (2014). Effect of different media on growth, flowering and cut flower yield of gerbera under protected condition. *Asian J. Hort.*, 9(1) : 228-231.

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Gerbera (*Gerbera jamesonii* Bolus) is one of the beautiful cut flower being grown commercially under protected condition. It is considered a promising and valuable cut flower crop next to rose, ranks fifth among top ten cut flowers of world market. The major production of gerbera has been promoted in and around Bangalore, Pune and certain pockets of Uttarakhand on commercial scale. Recently, its production has picked up and being grown under semi and controlled growing conditions.

Soil alone as a growing medium does not fulfill all requirements for its higher yield and quality. The introduction of the soilless medium has brought radical change in its protected cultivation and is gaining importance day by day. Gerbera grows well in substrates such as coco peat, sawdust,

vermicompost, farm yard manure (FYM), rice husk etc. Production of gerbera can be further enhanced and improved by growing in substrate culture. So keeping in view, an attempt has been made to study the performance of growth and flowering of gerbera affected by different amendments in growing medium.

RESEARCH METHODS

The present investigation was carried out at Hi-Tech Horticulture Park, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh on Gerbera cv. Alcochete during August 2011 to February 2012. The media used were normal soil, rice husk, coco peat, castor cake, vermicompost, farm yard manure (FYM) and sawdust.

Five week old tissue cultured plants with 4-5 leaves were planted in beds and experiment was designed in a Completely Randomized Design (CRD) with three replications. The details of the treatments is given in Table A.

M ₁	Normal Soil + Rice husk + FYM (1:1:1)
M ₂	Normal Soil + Coco peat + Vermicompost (1:1:1)
M ₃	Normal Soil + Sawdust + Castor cake (1:1:1)
M ₄	Normal Soil + Rice husk + Coco peat + Castor cake + Vermicompost (1:1:1:1:1)
M ₅	Normal soil

The media samples were collected from 15 cm depth of bed. While, the leaf samples were collected at the end of the experiment. The observations related to vegetative and flowering parameters were recorded using standard procedures. The comparative LSD multiple range test ($P=0.05$) was used to determine differences between treatments.

RESEARCH FINDINGS AND DISCUSSION

The data on growth parameters presented on Table 1 shows that, the media included normal soil + rice husk + coco peat + castor cake + vermicompost in equal proportion (M₄) recorded highest plant height (22.93 and 24.50 cm, respectively) and plant spreads (34.49 and 42.07 cm², respectively) at first flower appearance and pick flowering stage. The similar trend was noted for number of leaves and number of suckers per plant and were recorded highest with the application of normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1:1) (M₄). However, they were found at par with an application of normal soil + rice husk + FYM (1:1:1) (M₁), normal soil + coco peat + vermicompost (1:1:1) (M₂) and normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1:1) (M₃). The poorest response was observed in normal soil (M₅) for all growth parameters. They also supply good amount of available nutrients which favors stem elongation by increasing cell division in sub apical meristem. Micro flora present in the soil continuously mineralized complex substances and synthesized a whole series of biologically active metabolites which able to influence more number of suckers. The findings are in accordance with the results of Jawaharlal *et al.* (2001) stated that coco peat applied alone or combination with FYM resulted in the highest plant height, plant spread and number of suckers per plant in anthurium. The same findings were noted by Pawar *et al.* (2002). Barreto and Jagtap (2002) revealed that coco peat + vermicompost (1:1 v/v) gave best vegetative growth in gerbera cv. SANGRIA. These findings were much similar with results of Thangam *et al.* (2009). Anuje *et al.* (2004) revealed that red soil and FYM in a 1:1 ratio recorded the maximum values for plant height and number of leaves in gerbera.

In case of flowering parameters (Table 2), the media

enriched with normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1:1) recorded least days to appearance of first flower bud and open first flower (50.16 and 56.83 days, respectively). Similar variation was also observed in different flowering parameters and longest flowering span (141.97 days), flower diameter (12.03 cm), maximum number of ray florets (190.09), flower stalk length (54.59 cm) and flower stalk thickness (6.44mm) were registered in treatment of media with normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1:1) (M₄). However, it was noted at par with of normal soil + rice husk + FYM (1:1:1) (M₁), normal soil + coco peat + vermicompost (1:1:1) (M₂) and normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1:1) (M₃). The number of ray floret is positively correlated with diameter of floret. Likewise, the longest days to appearance of first flower bud and first flower opening, lowest flowering span, flower diameter as well as flower stalk thickness were observed in normal soil (M₅). The better results may be due to good vegetative growth converted to reproductive growth of plants in higher organic matter enriched media. The differences in cut flower quality parameters might be due to more organic matter percentage in media which facilitates availability of essential nutrients resulted to increase in cell division, elongation and cell size. Luxuriant growth with more green biomass of plant have more availability of primary and secondary metabolites resulted to higher source to sink ratio responses the more diameter of flower. The increased flower head diameter may be related to the optimum growing conditions of the medium *i.e.* lower bulk density, high porosity, high water holding capacity as well as better nutrient uptake. The result was also in conformity with those of Parmar (2006) reported that the treatment 500 g vermicompost per plant significantly increased diameter of flower, number of petals per flower in rose cv. GLADIATOR. Puvinder *et al.* (2008) showed that FYM gave best results for flowering parameters in gladiolus. Aswath and Padmanabha (2004) observed that the medium containing 100% coco peat produced good flower quality in gerbera. Thangam *et al.* (2009) revealed that vermicompost gave best quality flowering in gerbera among five different growing media like sand, FYM, vermicompost, rice husk and coco peat.

The variation in longevity and vase life of flowers were also found significant due to different media and highest (15.70 and 10.31 days, respectively) were recorded with an application of normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1:1) (M₄). The increased longevity and vase life of the flowers are the important parameters and it might be due to the vase life is directly related to dry matter production as well as size of flowers. Gerbera flowers with strong stem were less likely to fold in the vase due to turgor pressure maintained. The internal storage of carbohydrate content of the flowers was also responsible for the longevity and vase life of cut flowers. Especially, coco peat maintained

higher water content in media which leading to enhanced longevity and vase life of flowers. These findings are in agreement with those of Bhatia *et al.* (2004) observed that the soil + FYM + coco peat was found as the best medium for enhancing the vase life in carnation cv. Sunrise. Jawaharlal *et al.* (2001) studied that coco peat in combination with FYM increased inflorescence longevity in anthurium. Dien (2003) noted that the coco peat + sawdust + sand (1:1:1 v/v) was found superior with respect to vase life (13.4 days) in gerbera the same was founded by Gupta *et al.* (2004).

Data on yield parameters have been presented in Table 3. The highest fresh weight (42.10g) and dry weight (14.11g) of cut flower were noticed with normal soil + rice husk + coco

peat + castor cake + vermicompost (1:1:1:1) (M₄) but it was closely followed by normal soil + rice husk + FYM (1:1:1) (M₁), normal soil + coco peat + vermicompost (1:1:1) (M₂) and normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1) (M₃). The similar trend was also noted for number of flower per plant and flower yield and the highest number of flowers per plant and number of flowers per sqm. (8.97 and 89.67, respectively) as well as highest flowers yield (17.93 lacs/ha) were registered in treatment normal soil + rice husk + coco peat + castor cake + vermicompost (1:1:1:1) (M₄). This might be due to vigorous vegetative growth and increasing the carbohydrate reserve material with the proper uptake of all available nutrients also increase the number of

Treatments	Plant height (cm)		Plant spread (cm ²)		Number of leaves per plant	Number of suckers per plant at last harvest
	At first flower appearance	At pick flowering stage	At first flower appearance	At pick flowering stage		
M ₁	21.54	22.96	32.30	39.01	16.80	3.08
M ₂	21.54	23.43	33.17	39.80	16.33	3.27
M ₃	22.07	22.69	33.28	39.78	17.07	3.32
M ₄	22.93	24.50	34.49	42.07	17.13	3.61
M ₅	21.37	22.44	29.62	35.83	15.26	2.81
S. E. ±	0.34	0.42	0.91	0.95	0.37	0.11
C.D. (P=0.05)	0.98	1.23	2.62	2.75	1.08	0.31
C.V. %	4.63	5.49	8.36	7.26	6.78	10.03

Treatments	Days to appearance of first flower bud (days)	Days to open first flower (days)	Flowering span (days)	Diameter of flower (cm)	Length of flower stalk (cm)	Flower stalk thickness (mm)	Number of ray florets per flower	Longevity of flowers (days)	Vase life (days)
M ₁	51.62	57.40	137.71	10.44	52.19	6.28	186.30	14.82	9.51
M ₂	52.97	59.81	138.06	11.30	53.96	6.20	186.56	14.90	9.70
M ₃	52.19	59.14	136.19	11.22	53.81	6.10	188.09	15.04	9.84
M ₄	50.16	56.83	141.97	12.03	54.59	6.44	190.09	15.70	10.31
M ₅	54.63	61.52	133.53	10.17	49.26	5.71	178.13	14.33	9.13
S.E ±	0.84	0.80	1.01	0.20	0.83	0.10	2.36	0.18	0.15
C.D. (P=0.05)	2.42	2.31	2.91	0.57	2.38	0.30	6.82	0.53	0.45
C.V. %	4.81	4.08	2.20	5.41	4.69	5.01	3.81	3.67	4.77

Treatments	Fresh weight of cut flower (g)	Dry weight of cut flower (g)	Number of cut flowers per plant	Number of cut flowers per sq. meter	Cut flower yield per hectare/year (lakh)
M ₁	38.33	12.28	7.93	79.33	15.87
M ₂	40.24	13.07	7.88	78.78	15.76
M ₃	38.02	12.41	7.11	71.11	14.22
M ₄	42.10	14.11	8.97	89.67	17.93
M ₅	36.27	10.72	6.89	68.89	13.78
S. E. ±	1.36	0.65	0.26	2.60	0.52
C.D. (P=0.05)	3.92	1.87	0.75	7.51	1.50
C.V. %	3.42	5.46	10.06	10.06	10.06

suckers of plant, number of flower stalk which resulted to the more number of cut flowers. This could be due to the better physical properties of the substrate media which influences the absorption of nutrients by the plants. As the vegetative growth was better, it would have influenced positively on flower production. While, lowest response was noted in normal soil (M_2). These finding are in agreement with those of Dutt *et al.* (2002) investigated that coco peat + compost showed maximum number of flowers in chrysanthemum. Singh (2005) recorded maximum number of flowers/m² during second flush and weight of flowers/m² with an application of FYM (5 t/ha) in rose. Baheer (1997) investigated that coco peat gave maximum number of flowers in gerbera. Dien (2003) reported that coco peat + sawdust + sand (1:1:1 v/v) were found highest number of flowers per plant (29.55 flowers/plant), number of flowers per m² (21 flowers/m²). The same was reported by Gupta *et al.* (2004).

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